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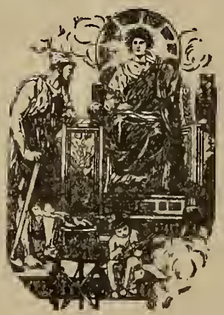

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ILLUSTRATED SUPPLEMENT:—Roman Cup in the Archives of the Church at Bergen on the Isle of Rugen (about 1200).

The Worthies of Horology.

By C. Stuart Murray.

XIII.

DR. HOOKE.

THERE is no name that fills so large a space—and justly fills it—in the horological mind, as he who is the subject of the present paper. So scientifically practical, so invaluable, and so enduring in its permanent effects upon the material advancement of civilisation has been his great invention of the balance-spring to watches, that he well deserves a prominent pedestal in the temple of fame. Where would have been the measurer, the truthful measurer of longitude; where would have been the trustful monitor in sunshine and in cloud to the noble ship cleaving her undaunted course through the pathless waves, had the balance-spring remained unknown? The more the matter is thought over the more expands the marvel; the marvel that a few coils of steel wire, suggesting a human hair, attached to the axis of a reciprocating wheel in motion, should so regulate the action of its kindred machinery, machinery that can be made sufficiently small to work in the waistcoat pocket, that the observer can, as it were, confidently wend his way among the stars! Yet, so it is, and so may it continue moving towards perfection. There is an ancient philosophic maxim that when the want of something great for mankind has been established, then arises the man to supply it. And there is much truth in this; for so it was here, and so it has been in many another case along the joyful halting-places of scientific discovery.

Robert Hooke was born on the 18th of July, 1635, at Freshwater, in the Isle of Wight, his father being the Minister of that parish. And here let me add, that whenever the horological devotee goes for his holiday, let him think of "The Island." It may be somewhat singular to say, but there are scarcely ten holiday visitors in a hundred to the Isle of Wight, who could tell you off-hand where Freshwater is! The place is mostly spoken of as Freshwater Bay, and it is fitting that all who are engaged in the watch trade should know a little about this summer resort. Freshwater lies inside the mouth of the Solent, or continuation of that arm of the "Southampton water" which runs from the last-named town to the sea. The best way of reaching it is from Lymington by ferry across to Yarmouth, and on by road to Freshwater village. The Rectory is adjoining, but no doubt there may be traditions of the great horological Worthy extant in the neighbourhood. Continuing his course onward from the village and the Rectory, the visitor will arrive at Freshwater gate looking out upon the bay. Cities and towns will be left behind him, whilst the broad expanse of the English channel, with its yachts and boats, and great ocean steam-ships, will be before him sailing onward and toward, a very living panorama. This is the western part of the Isle of Wight, terminated by the well-known Needles round by "Sun Corner," and on to Alum Bay. The scenery, even for the Island, is exceptionally beautiful.

Having shown a taste for drawing, young Hooke was, soon after his father's death, entered as a pupil under Sir Peter Lely. We thus see by his surroundings that he was living and learning among the most highly cultured society of his time. It may not be, and indeed is not, generally known that the royal portrait-painter of the court beauties of Charles the Second's days, was, in his real name, Peter Vander Faes. Those who go to Hampton Court may see some of his work adorning the walls of that palatial building. Hooke's delicate health, however, forbade his applying himself to painting, and he consequently abandoned it; and his family seeing this, decided to send him to Westminster School, at that time looked upon as one of the severest places of education in England—probably is so still.

Amid such natural grandeur was the great scientific benefactor ushered into the world, and, as stated, was sent to Westminster School, under the "terrible" Dr. Busby. Why he became such a terror to the boys has never been clearly explained, for he began his own career in poverty. He passed from Westminster School to a studentship at Christ Church, Oxford; whilst so poor was he that the parish of St. Margaret's, Westminster, and the college joined in paying his fees for his first academical degrees. He did not forget the favour, for he left in his will £50 to the poor housekeepers of St. Margaret's. This was in addition to £525 a year to the same parish for charitable purposes. After having been a rector at Wells, in Somersetshire, in 1640, he was appointed head master of Westminster School. He remained there for more than five-and-twenty years, and was considered a hard-working teacher for his age. He certainly never spoiled the child through sparing the rod, always acting well up to the ideal of king Solomon in such matters. It is of him that it is recorded that when Charles the Second visited the school, he declined to unbonnet to his sovereign. Upon being remonstrated with for such apparently disloyal conduct, his answer was that his boys looked upon him as the greatest man in England; whereas, if they saw him take his hat off to anyone, he would immediately sink in their estimation to a depth below redemption, and the school would break out into a state of uncontrollable mutiny. At the same time, he hoped that his Majesty would graciously permit him humbly to pay his loyal and dutiful homage out of the sight of the pupils! It is stated that amid much good-natured merriment the request of the learned doctor was willingly granted. In 1660 he was made prebendary of Westminster, with the addition of other preferments; and in 1661 he had the high honour conferred upon him by the king, of carrying the *ampulla*, or vessel containing the anointing oil, at the coronation of Charles the Second. Although his discipline in the school is said to have been very severe, even for his day, yet he took all the morally objectionable parts out of certain Latin classics, so that his boys could read and study them in a harmless manner. One of the most extraordinary things in his history is, that no records of him have been preserved in the school over whose destinies he had so long and so ably presided. He died, "full of years and reputation," on the 6th of April, 1695, and was buried in Westminster Abbey. Over his grave a monument was erected, which may be seen by visitors who are that way interested.

Such was the man and such the tutor under whom young Hooke was placed to be educated. He was intended for the church, and in due time to succeed his father in the comfortable and pleasant rectory of Freshwater; but the weak state of his health, and his continued subjection to head-aches, obliged his family to abandon all hopes in that direction. On account of his tedious complaint he was left very much to himself; he turned his attention to practical mechanism, and made toys which showed much ingenuity. He, too, entered Christ Church, Oxford, in the year 1653, but had not been long there before he joined the Philosophical Society of Oxford, and soon became an assistant to Dr. Wallis, the professor of chemistry to the society. He afterwards filled the same office for Mr. Robert Boyle. This Robert Boyle also became famous in scientific history. He was the seventh son and fourteenth child in a family of fifteen, of Richard Boyle, Earl of Cork, and was born on the 25th of January, 1626, at Lismore, Ireland. The incidents of his early life and education have been entirely overshadowed by his investigations in chemistry and medicine. He constantly refused a peerage and other dignities, although possessed of a large fortune. This fortune he laid out in experiments, and in assisting in various ways in the dissemination of knowledge. He died on December 30th, and was buried in the vaults of St. Martin's-in-the-Fields on January 7th, 1692, a funeral sermon being preached on the occasion by Dr. Burnett, the author of one of the histories of the Reformation. He was the personal friend of three kings, a man of whom all his contemporaries spoke well, and had both high honours and emoluments at his call, indeed pressed upon him, but which his scientific mind as constantly refused. As bald notices of celebrities are to be avoided when practicable, I have given here some particulars of Dr. Hooke's surroundings, and the kind of men under whose guidance he commenced his valuable career. Turning his attention to horology, he made a clock, all the wheels of which were of wood; it kept the hours regularly, and was highly prized.

He had a great aptitude for mechanical work, and materially assisted Mr. Boyle in constructing the then newly-invented air-pump. He became versed in astronomical matters, and constructed some instruments for observing purposes. In 1662, he was appointed curator of experiments to the Royal Society, which then met at Gresham College. He was engaged to show members at every meeting several original experiments devised by himself, and to follow out such as might be recommended to him by the Society. This led to his making several important discoveries relating to the nature and properties of air.

The Royal Society of London for Improving Natural Knowledge was instituted in 1660, and incorporated by Royal Charter in 1662. As at present constituted, it is held to be the oldest Society of its kind in Europe, except one that exists at Rome. In 1663, a second charter was granted to remedy some otherwise incurable defects in the one of the year previously. When this charter was obtained, Dr. Hooke was appointed on the council, the repository of the Society was committed to his care, a gallery in the Gresham College of the time being set apart for its reception. In 1664 he was made "Professor of Mechanics," with a salary of £50 a year.

Before I go any further, I may as well mention the learned characteristics of the Society. It is divided into a number of committees, embracing mathematics, astronomy, physics and meteorology, chemistry, mineralogy, and geology; botany and vegetable physiology, zoology and animal physiology, making seven committees in all, but which may now take in other subjects not then specially recognised.

The Royal Observatory at Kew is held by the Society under a grant from the Crown; it has had for its presidents such eminent men as Sir Isaac Newton, Sir Joseph Banks, Sir Humphrey Davy, &c.

From a recent visit there, I am of opinion that the

Observatory is now chiefly occupied in the study of meteorology, electricity, and terrestrial magnetism. From these details it will be understood that our "Worthy" was breathing the very atmosphere of his scientific life.

In the same year that he was made professor of mechanics, he succeeded Dr. Dacres as professor of geometry. In 1665, he published his *Micrographia, or some Physiological Descriptions of Minute Bodies made by Magnifying Glasses*, with a dedication to the king. In 1668, Hevelius, having sent to Hooke a copy of his *Cometographia*, the latter returned the compliment by means of a copy of a tract describing his newly-invented "dioptric telescope." Every one knows what the word telescope means; but, perhaps, to readers whose lifetime has been for the most part spent away from costly learning, the term *dioptric* may not be so clear. In that case, perhaps, they will not deem me obtrusive, if I venture with some diffidence on my own part to tell them. Dioptric, then, is formed of two Greek words—*dio*, through; and *optomai*, to see. It is that part of optics which treats of the refraction of light passing through different mediums, as through air, water, or glass. As applied to telescopes, in which sense it is mostly used, it is the passing of the rays of light *through* the lenses that enables the observer to *see* more clearly than otherwise distant objects; in fact, to discern things that could not be taken in by the unassisted eye at all.

Joannes Hevelius, as Latinised; or more properly, John Hevel, a Polish nobleman, and an astronomer of singular eminence in his time, was born in 1611. He had travelled through the principal countries of Europe before he was twenty-five years of age, after which he returned home and devoted the remainder of his days to the close study and observation of astronomy. Among many productions from his pen he published, in 1673, the first part of his *Machina Cœlestis*, which gave rise to a long and angry controversy between Hooke and himself. Dr. Hooke did not shine in the encounter, through his dictatorial temper. Hevelius resided at Danzig, and ranks next to our first Astronomer-Royal, Flansteed, as an industrious, accurate observer. He died in 1688, in his seventy-sixth year. I have not ascertained whether or not the quarrel between the two distinguished men had ever been healed.

After the fire of London, Dr. Hooke offered a plan to the Court of Aldermen for the rebuilding of the City, which, although not carried out, procured him the appointment of a City surveyor. This, it has been stated, helped him to the acquisition of considerable property. In 1673 he proposed "a Theory of the Variation of Compasses," and in the following year "An Attempt to Prove the Motion of the Earth from Observations." Next came a paper on Helioscopes, or sun telescopes, and "A Description of some Mechanical Improvements." In 1677 he became secretary to his society. In 1691 he was created "Doctor of Physics," by a warrant from Archbishop Tillotson. He claimed Newton's discovery about force and the action of gravity, but got thoroughly worsted in the argument. In 1678, was published his lectures, *De Potentia restitutiva, or of spring*. This was the grand work for the future student-horologist, which will be further referred to presently. He died at Gresham College in 1702, in his sixty-eighth year, and was buried in St. Helen's Church, Bishopsgate Street, his funeral being attended by all the members of the Royal Society, and a vast concourse of people. He was always at work, and left a numerous collection of scientific papers behind him. The wonder was how a short, thin, crooked-made delicate man could have written them all. But it was well-known that, in addition to what he did during the day, he seldom went to bed until two or three o'clock in the morning, and sometimes he was up the whole of the night.

He thus commences his paper, *De Potentia restitutiva*:—"The Theory of Springs, though attempted by divers eminent Mathematicians of this Age, has hitherto not been Published by any. It is now about eighteen years since I first found it out, but designing to apply it to some particular use, I omitted the publicity thereof.

"About two years since, I printed this Theory in an Anagram at the end of my Book of the Description of Helioscopes, *viz.*, c e iii n o sss tt uu, *id est*, *Ut tensio sic vis*; that is, The Power of any Spring is in the same proportion with the Tension thereof. That is, if one power stretch or bend it one space, two will bend it two, and three will bend it three, and so forward. Now, as the Theory is very short, so the way of trying it is very easy. Take then a quantity of even-drawn wire, either Steel, Iron, or Brass, and coyl it on an even cylender into Helix of what length or number of turns you please, then turn the ends of the wire into Loops, by one of which suspend this coyl upon a nail, and by the other sustain the weight that you would have to extend it, and hanging on several Weights, observe exactly to what length each of the weights do extend it beyond that length that its own weight doth stretch it to, and you shall find that if one ounce, or one pound, or one certain weight doth lengthen it one line, or one inch, or one certain length, then two ounces, two pounds, or two weights will extend it two lines, two inches, or two lengths, and so forwards. And that is the rule or Law of Nature upon which all manner of Restituent, or Extension, or Condensation and Compression moves?" He also says:—"About three years since His Majesty was pleased to see the experiment that made out this Theory tried at Whitehall, as also my Spring Watch." The full title of this paper is itself interesting to us, now. It runs thus:—

"LECTURES DE POTENTIA RESTITUTIVA, or of Spring Bodies, by ROBERT HOOKE, S.R.S. LONDON: Printed for John Martyn, *Printer to The* ROYAL SOCIETY, *at the* Bell, in St. Paul's Churchyard, 1678."

S.R.S. means "Secretary Royal Society."

In the same paper he gives directions for coiling a watch-spring into a spiral, and trying it on a wheel mounted on an arbour with steel pivots, and coiling a small silk thread on the arbour, the wheel being in a frame suitable for the purpose. At the free end of the thread is to be attached a scale to hold a weight, and an index to mark the action of the spring with the different weights and the distance that the wheel will move. By such an arrangement the ratios of the actions will be arrived at. As the discovery was published in 1668, and Hooke says that he found it out some eighteen years previously, that would lead back to the year 1650, or more than two hundred and thirty years ago! A goodly number of watchmakers and watch-wearers since then have had much reason to be grateful to the labours and to the memory of Dr. Hooke. He speaks about being in treaty with several "persons of honour" to discover some invention for measuring time by applying springs to the arbour of the balance of a watch regulating the vibrations in all positions. Upon reading the whole of the case, it does not appear that the "persons of honour" behaved in the affair quite as honourably as they might have done.

The fragile nature of Dr. Hooke's bodily powers has been mentioned, and I will here say a few words more about it. In personal appearance he looked very uncomely. His figure was crooked, his limbs shrunk, his face haggard, whilst his long, unkempt hair, hanging closely over his shoulders, gave him a weird and unearthly look—far from showing indications of the rich, active mind within. Perhaps the reader will be a little surprised to learn that he suggested a mode of weather forecasting, and a system of telegraph signalling. He investigated the nature of sounds, and the function of the air in respiration and combustion, and is said to have originated the idea of the pendulum being used as a measure of gravity. His inventive faculty was surprisingly great, but seemed almost surpassed by his mechanical faculty, and his unrivalled sagacity in the discovery of the general laws of phenomene. His paper, already mentioned, entitled, "An Attempt to Prove the Motion of the Earth from Observation," was published in the *Philosophical Transactions*, in 1674. He says:—

"I will explain a system of the world differing from any yet known, but answering in all things to the common rules of mechanical motions, which system depends upon three suppositions.

1.—That all celestial bodies whatsoever have an attraction or gravitating power towards their own centres, whereby they attract not only their own parts, and keep them from flying from them (as we may observe the earth to do), but also all other celestial bodies that are within the sphere of their activity.

2.—That all bodies whatsoever that are put into a direct and simple motion will so continue to move forward in a straight line till they are, by some more effectual power, deflected and bent into a motion that describes some curved line.

3.—That these attractive powers are so much the more powerful in operating, by how much nearer the body wrought upon is to their own centres.

Such is an outline of the life and works of one of the foremost horological Worthies who ever lived. It has been gathered from many sources, and it is to be regretted that the materials are not so plentiful as could be desired, from which to build up the detailed story of the life of as great a benefactor in his way as the world ever produced. It is, too, more than singular that, although he experimented and wrote, and invented much, his fame rests, and will chiefly rest, upon the balance-spring of watches. As I said at the beginning, he well deserves a prominent pedestal in the Temple of Fame; and in devoting this paper entirely to him, I believe that I have done well, and may count on receiving the approbation of my readers. I shall have to refer to him again.

◆

Queries and Replies.

Can any reader oblige by informing me how to frost silver?—E. W.

AN IMPROVER writes:—"I find a difficulty in getting a set of screws to blue alike. Is this anything to do with the temper? I have been cautioned against leaving them too hard."

[BLUEING a set of screws is one of those operations which calls for an especial amount of "knack" and practice on the part of a workman. The temper should not be lower than a light blue, and the threads require cleaning, by being worked in a piece of firewood with oil-stone dust, or wet emery. After trimming up the slits, smooth the heads and edges with a slip of Arkansas stone. Polish with a zinc polisher and diamantine, taking care never to work it dry, or to cut the polisher. The bread used to clean them should be as free as possible from alum, the presence of which can be detected by the following simple process:—Warm an ordinary table knife and stick it into the loaf; on withdrawing it, a white deposit will be found on the blade. Some workmen never can blue screws, owing to the damp clammy condition of their hands, which prevents them from mixing up the bread properly. The screws should be lightly held in a pair of nippers, and brushed with a clean soft brush; a hard one is likely to make them red on the edges. After brushing, they should be blued at once. Drill holes in the bottom of an old barrel, and place it in a blueing pan, taking care that the flame of the spirit lamp is not blown about by the external air. The remainder entirely depends on the judgment of the operator in lifting them out of the holes at the proper instant. The tweezers must be perfectly clean].

English and Foreign Silver Work,*

A PAPER READ AT THE SOCIETY OF ARTS, BY WILFRED CRIPPS, F.S.A.

(*Continued from page* 148)

I HAVE been asked to read a paper to the Society upon a subject to which I have paid a great deal of attention for some years; and I must begin by saying that it was only with much hesitation that I ventured to accept the invitation, feeling that I might not be able to make my subject as interesting, as it seems to myself, to a critical audience, accustomed to discuss, from week to week, geographical, scientific, and commercial questions of greater national importance than any that an art-industry—even if a considerable one—can lay claim to.

I propose to treat the subject of the goldsmith's art from an historical point of view, and, considering its present position amongst the industrial arts, rather than dealing with its technical processes, to endeavour to show how a freer access than has hitherto been possible to the best examples of the work of past days, may be made to carry forward the objects of a Society established "for the encouragement of Arts, Manufactures, and Commerce."

It is some advantage to me that the subject has not engaged the attention of the Society for years past—not, I believe, since the late Mr. Burges's Cantor Lectures in 1864; for a great deal more is now known of gold and silver work, its history, dates, and styles, than was known then.

This is due to various causes, partly to the interest excited in the art of dating old English plate, first by the Antiquarian discoveries of my friend Mr. Octavius Morgan; and partly to the attention that the art revival of the past quarter of the century has drawn to questions relating to the industrial arts.

It may be as well to indicate the ground covered by Mr. Burges's lectures, without attempting to go over it again. He rather dwelt upon the antiquities and technicalities of craftsmanship, from the days of the Roman Mentor and his wealthy patron, Lucillus Crassus, down to mediæval days; reviewing, shortly, the processes by which the precious metals were enriched with ornament, such as engraving, embossing, enamelling, chasing, punching, filigree work, and the like; and enumerating a few of the more important classes of objects upon which the mediæval smith worked for church, noble, or wealthy guild. Chief amongst these were chalices, and the curious "nefs," which formed so striking a feature in the table arrangements of our ancestors. He then turned the attention of the Society to jewellery, noting the interesting fact that Signor Castellani was said to have discovered men, in some remote villages of Tuscany, still working at the ancient art of frosting articles of jewellery in gold, by soldering particles of the precious metal upon their surfaces—an art long supposed to be wholly lost; and he finished his sketch by a notice of the coinage of different countries, from Greek times and the celebrated Syracusan series, down to our own Georgian money, which he compared with that of the French Republic, somewhat to the disparagement of English art at that period.

It will be seen from this short summary of Mr. Burges's lecture, that amongst the industrial arts, that of the goldsmith is by no means an insignificant or unimportant one; and it is perhaps open to question why it does not seem to have shared to the full the tide of advance, from an art point of view, that has come to many others of the industries that minister to the comfort and luxury of modern life.

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* In the report of the discussion given last month, taken from the *Journal of the Society of Arts*, Mr. W. Martin Wood is made to say that the effect of the excise and import duties on gold and silver plate was to "prevent freedom of trade in electro-plated goods." He has since written to that *Journal* to say that he meant exactly the reverse, and that the duties operate as a bounty and premium in favour of simulated plate, and as a deterrent from the use and manufacture of silver articles.—ED.

It is trite, at this time of day, to remark that, in the earlier days of the present century, all these arts were neglected alike; that people were satisfied to buy what the tradesmen offered; and contented, if objects of taste or beauty of design were desired, to go abroad to more art-loving countries, and fetch them home for themselves.

All this is now altered, chiefly owing to the enlightened mind and foresight of H.R.H. the late Prince Consort, and the development of his work and wishes into such powerful agencies as the Society of Arts, and State Departments like that which our distinguished friend in the chair now so ably directs.

The improved position of the decorative art-industries in England is so obvious and so fully admitted, that it hardly needs to insist on the prosperity that has been more than ever marked since the last Paris Exhibition. Suffice it to say, that Mons. Lockroy, in a Report of the year 1881, to the French Chamber, on the estimates for the fine arts, says plainly, "England has become our equal in furniture and ceramics." I quote this, because it leads up very conveniently to the way in which I propose, with your permission, to treat our subject this evening.

M. Lockroy does not mention English *orfèvrerie* as to be feared; and this coincides with a somewhat general belief that, in gold and silver work, England does not show so decided an advance as in the lines which M. Lockroy especially mentioned, to which he might have added several others.

Under the general term of silver ware must be included, for our present purpose, and in deference to the wants and requirements of the day, electro-plate; for the art of the matter, so far as that goes, is the same whether it is presented to the eye of the purchaser in real silver, or in some cheaper material, taking the same forms and appearance.

We need not, perhaps, take it for granted that, as regards these crafts together, we do not observe in our shop windows any of the same advance that is so noticeable in glass, pottery, tapestries of all kinds, furniture, and the like; but whatever want of progress we choose to admit, we can comfort ourselves with the feeling that the art is backward not alone in our own country. My own opportunities of observing such things convince me that neither the French nor the Germans produce any better nor any more artistic silver and electroware than ourselves; and if now and then some American fashion of decorating plate seems to carry all before it for a few months or a year, after a short time you can no more find the class of work which was for a season so popular, than you can get a copy of the *Daily News* or the *Standard* of day before yesterday.

It must further be laid down against ourselves, if we do admit want of taste and lack of good art in the articles displayed in the windows of our silversmiths, that it is really, and in the end, attributable to want of demand on the part of the public for something better.

Trade depression or stagnation is a good excuse, a good herring to trail across the scent, but it has very little, if anything, to do with the matter. It is not that shop windows are too empty, but too full of bad art, so full, indeed, that they contradict of themselves the very allegation of any serious depression.

It must be borne in mind that it is utterly fallacious to take the weight of silver work paying duty as any measure of the amount of silver worked up annually, which is enormous. Such returns take no account of the great amount of metal used in the electroplate trade; and, however much some may deprecate it, much of the money that was formerly spent upon silver plate is, and will be for the future, spent upon electro wares.

Of these two classes of goods taken together, it is not the fact that the public are not buying all they want, and at prices that are remunerative to the trades; but it is the fact that, owing to want of educated taste, and for the want of the stimulus that access to, and study of, the best models of other times would supply, the general public have been contented with what they found ready made; and the manufacturer has been well pleased to supply his customers with things of which he had stock patterns, so long as the public were contented with them.

Neither party is exactly to blame for this state of things. It is difficult to believe how little was known about old English silver work, as a matter of art-history, twenty-five years ago. Perhaps a dozen pieces, including the regalia at the Tower, were all that were popularly known, and the supposed histories of many of these specimens has turned out to be entirely imaginary.

It is just here that Government, and Government alone, can assist an art-industry in the most useful way. It is all very well to cry out for direct help, for protection, for bounties, for impossible or inopportune remission of taxation, and the like. In the present case Government can do what is much better. It can make it the business of its art-departments not only to educate the trade and the workman, and encourage the supply to the public of good art work, through the machinery of its schools of design and technical schools, but to educate the eye of the public itself, and to create a dissatisfaction with, and a distaste for, anything that is not good.

Now, what has Her Majesty's Government effected for the goldsmiths' art at present? It has, in the first place, set itself to show that the art of the goldsmith in England is an art with a history; that it has had periods of excellence which have given its productions from time to time the rank of works of art, and to their authors that of artists. It has used its influence—an influence no private person or body can wield—to find out in what treasuries and depositories, royal, collegiate, or corporate, ecclesiastical or secular, the most precious and typical specimens of the art of all ages in English history are preserved. And it has obtained permission to make copies in *fac-simile* of them, not only for the use of the art-student in the metropolis, but for the purpose of sending them throughout the length and breadth of the country, for the use of his provincial brother studying in the local schools of art which have been everywhere established, and for furnishing local exhibitions on a circulating loan system, of which the success promises, I think, speaking as one of the outside public, to be most remarkable.

May I be pardoned for mentioning that two former pupils of the small country school of art in which I myself am most nearly interested—pupils whose humble parentage would, only a few years ago, have put any art-education entirely out of their reach—have works on the walls of the exhibition of the Royal Academy for the present year.

I am able to-night to submit to the examination of the Society a series of these reproductions, which illustrates the history of silver-working in a way that, till lately, would have been impossible, except on one of those rare occasions like the Loan Exhibition at South Kensington, in 1862, when a sufficent number of precious and treasured objects could be drawn from their hiding places and exposed to public view, for a few weeks or months at the most. And I hope it will not be tedious if I say a few words about some of them (for they are very little known), pointing out the reasons for their selection and their place in the history of the art. I may mention that almost every collection in the kingdom was freely placed for these purposes at the disposal of the Science and Art Department, from Her Majesty's own treasures, those of the colleges of both our great Universities, and the great guilds in the City of London, downwards; and the result is that every age and every style and varying fashion of English silver working, for four centuries, is represented by its best remaining specimens. I feel sure the Society will hope with me that this liberality may be productive, in due course of time, of the happiest result to the art and craft in England, and I will add abroad; for the work undertaken by the British Government, I think Sir Philip Cunliffe-Owen feels, is to some extent an international one.

Let me first draw your attention to this English series —a history of English plate working in epitome. We must not expect to find such treasures of ancient art in England as the Scythian ornaments from St. Petersburg, brought there from the Cimmerian Bosphorus, the Gothic treasures discovered in Wallachia, or the Visigothic votive crowns found near Toledo. The earliest English work known consists of personal ornaments of the Saxon period, and Celtic gold work in torques, armlets, gorgets, and the like, found in Ireland. We must pass over such relics as the Ardagh Cup and the St. Patrick's bell-cover (an electrotype copy of which may be consulted in the South Kensington Museum), and come to the 14th century at once. Not but that, for two hundred years before that, the craft had flourished in England; the Goldsmiths' Company had been fined for being "adulterine," or established without royal licence, as early as the year 1180, and whole generations of craftsmen, especially famous for their *champlévé* enamelling, had lived and died. The Goldsmiths' Company of London was regularly incorporated in 1327, and its mark of a leopard's head is even then described as "anciently ordained."

The earliest known piece of importance is of about this period. It is the Mayor of Lynn's cup, traditionally said to have been given to the borough of King's Lynn by King John. Like other traditions, this is without foundation in fact; for the costumes of the enamelled figures with which the ground of the bowl is covered are of the middle of the 14th century. It is, however, of excellent Gothic taste, and is a worthy introduction to English craft-work. The delicate enamelling renders it unsuitable for reproduction; we soon, however, come to objects that can be copied.

Amongst the most familiar examples that represent this same century are the standing drinking horns preserved at Queen's College, Oxford, and at Corpus Christi College, Cambridge, and William Wykeham's mitre at New College, Oxford. The piece called the "Giant Salt," bequeathed by Archbishop Chichele to his foundation of All Souls, in the same University, a copy of which we have here this evening, takes us into the 15th century. Its size and importance reminds one of the honoured place of the principal salt at mediæval feasts, and its cover, and perhaps its material, of the fear of poison under which our forefathers seem to have lived. Not only were salts and drinking vessels closed, but they were often mounted with, or made of, some substance having the supposed power of revealing the presence of poisons. Some kinds of crystals were thought to become clouded, and some precious stones to change colour, if poison were introduced into vessels in which they were mounted.

The Valence Marie, or Founders' Cup, from Pembroke College, Cambridge, is also on our tables this evening, and is an instance of a bowl that probably once was a mazer, but getting broken, and the mottled and veined maple wood of which it was made being difficult to replace, silver-gilt was substituted for wood, and a metal bowl fitted to the original Gothic rim.

These mazers, so much prized by our ancestors, appear to have been merely drinking bowls, though their elaborate ornamentation and enamelled bosses or "prynts" has suggested a doubt as to this in the minds of some antiquaries. The inscription round the rim of the Valence Marie cup is conclusive, running as it does—

> "Sayn-denes-yt-es-me-dre.
> For-her-lof-drenk-and-make-gud-cher."

The foundress of Pembroke College was Marie de Valence, mother of Aylmer de Valence, Earl of Pembroke. The cup is hardly of her time, but is, perhaps, of the last years of the 14th century.

I am afraid that the space allotted to a paper in the Society's *Journal* will not allow of more detailed notice of these curious and early objects. Others of them upon the table carry us through almost each decade of the late Gothic period, which, for plate-working, ends rather sharply at about the year 1500. There is very little of the *quattro-cento* style to be observed in English goldsmiths' work. The next century is the best period in the history of English art—the Renaissance period—it includes the reigns of Henry VIII. and Queen Elizabeth. The mention of the former may remind us that it was not beneath the dignity of a Holbein to design for the goldsmith, any more than it was beneath an artist so famous as Flaxman late in the eighteenth century.

The Tudor period, again, is represented here by some of its best specimens, including a cup of 1523, given by Henry VIII. to the Barber-Surgeons' Company of London, a work of very beautiful shape and design.

The "Poison Cup," from Clare College, Cambridge, is a good specimen of filigree chasing, and the crystal mounted in the lid explains its name.

A most curious cup is one given by Mary Queen of Scots to Perth Cathedral. It is of excellent Nuremberg work, and of about 1560, but the upper part is a Scotch repair, executed, as a well recognised hall-mark upon it testifies, in Dundee about 1637. The end of the century brings us to splendid examples of the ewers and salvers which were so useful before the days of forks. They were handed after every meal, or even every course, with water warm and scented, a not unnecessary custom when lady and gentleman ate with the fingers, helped only by an apostle spoon, out of the samo mazer bowl.

I am sorry to say, that the very earliest piece in the Royal Collections at Windsor is no older than this. It is a characteristic salver of 1595, decorated in cartouches with marine monsters, a style of ornament very prevalent for about thirty years. It is by the same maker as a very excellent *repousse* salt at Haberdashers'-hall, the gift of one Sir Hugh Hammersley, in 1635. I am sorry to say, that in the South Kensington Museum handbook it is accidentally attributed to this latter year, instead of to the year of its make. The ewer accompanying it is almost exactly like one that is the oldest piece at Eton College, and it is of the year 1614. It is by the maker of the very fine set of communion-plate that belongs to Ladbroke in Warwickshire.

Fine examples, the property of the Corporation of Norwich, illustrate the work of the closing Elizabethan period; and of standing cups there is no better example than the Founder's Cup at Emmanuel College, Cambridge, which it has been the fashion to attribute to the hand of Cellini. It is, however, somewhat too late in date to have been the work of that great master.

Turning over the leaf into the sixteenth century does not bring us at once to any fresh style. The fashions of the Renaissance last us until the severe simplicity of the Puritan *régime* and troubled days end the history of an ornamental art, till the days when the king got his own again, and his followers began to replace the plate that their fathers had sacrificed at the bidding of Royalist devotion or Roundhead zeal.

We now come to the notable and much admired specimens of the Charles II. period, the great cups, decorated with the acanthus ornament which was then so prevalent; and the silver furniture, of which Windsor and Knole have furnished the student with matchless examples.

The furniture at Knole was long supposed to have been brought from Spain for the reception of King James I., when upon occasion he lay at the princely home of the Earls of Dorset. It proves by its fashion, when these things became better understood, to have been a set of boudoir furniture made in London; probably on the occasion of a widowed Countess of Dorset remarrying, at a great age, in about 1680, Sir Henry Poole, Master of the Rolls, and Member of Parliament for my own town of Cirencester, near which he resided.

Every later generation is fully represented, bringing us through the plainer styles in vogue at the commencement of the eighteenth century, to the period we call the Rococo and Louis XV. The former of these epochs, so amply represented by many specimens of French plate, is hardly to be counted as an English period. The later work of that celebrated smith, Paul de Lamerie, who worked in London from 1712 to 1750, show traces of its influence, but traces only. Lastly, the "oviform period," if I may call it so, brings us to the end of the century. The cups and urns of more than one City Company, such as the urn of 1776, belonging to the Barber Surgeons, and a cup of 1795, the gift of one Roberts, to the Merchant Taylors, well represent a style that has been rendered so popular by the pottery work of the great Josiah Wedgwood. The discovery of Pompeii put a summary end to the Louis XV. period, and turned the thoughts of designers into the classical direction which ruled the decorative arts for the last quarter of the eighteenth century. It is, perhaps, the most familiar style of all to our minds, partly owing to the numberless houses in London that long preserved, some externally and others internally, in their ceilings and their chimney-pieces, the popular works of the Brothers Adam, the builders of the room in which we are now assembled. The next generations are almost blank as far as the history of the art in England are concerned, and I am sorry to have insensibly divided even the last century dealt with into periods marked by French names. The truth is, that France has so stamped the fashions of that century with an individuality of her own, that those names are, in fact, the only ones which recal the fashions they stand for, and describe, without further explanation.

I would here make a remark upon the value of our English series of specimens of old plate as a basis for a work upon what I may call "the chronology of ornament." Owing to the regular system of hall-marking it exhibits, many small mistakes in the supposed sequence of fashion have been corrected, and it is possible to date unmarked specimens, not approximately, as is the case with the sister arts, but almost to a year. The ornamentation in vogue at one period or another is so much the same throughout the whole range of the decorative arts, that from the information supplied by a series of specimens of old English plate, other, and apparently dissimilar, classes of objects may often be accurately assigned to their proper period in art history.

We have now gone through the English series in sufficient detail to understand what has been effected for the history of old English plate; and it is worth saying that only one treasure-house (the situation of which it would be invidious to particularise) was closed by its owners against inspection; their refusal courting contrast with the free permissions accorded by her Gracious Majesty, H.I.M. the Czar of Russia, every college at Oxford and Cambridge, and the greater of the City companies. It may not, after this, surprise the Society of Arts that the refusal was grounded (I am obliged to take it that this was its reason) upon the recent regilding of the collection, and the alleged fear that it might be injured by moulding from its specimens. It is, unfortunately, true that the collection has been regilded; and it is, unfortunately, also true that this same regilding has destroyed a veritable epitome of the history of old English gilding and parcel-gilding, the series having until lately illustrated every phase of this interesting art in the most charming and picturesque manner. It was, perhaps, unique.

Lastly, as regards this collection of reproductions, it may safely be said that it is as valuable and useful, for the purposes of art study, as the original pieces themselves would be. A "type set" is, I believe, kept as complete as possible, at South Kensington, arranged in chronological order, so that one has only to pass down a row of cases to obtain an historical view of four centuries of workmanship at a glance. Each case is conspicuously labelled with the century or shorter period which its contents illustrate; and the only thing left to be desired, is a system of detailed labelling, which may tell the poor student, who has no hand-book, a little more of the history of each object and the reason of its selection.

It is the admirable labelling of some of the museums of the north of Europe, particularly the Hamburg Museum, under the intelligent care of Dr. Brinckmann, that seems almost to have given birth to more than one art-industry that is now flourishing in that city. A school of artists in leather work have obviously drawn their inspiration from the collection of ancient specimens of bookbinding, that owes its great educational importance chiefly to the arrangement and ticketing it has received at Dr. Brinckmann's hands. I wish that time served for a digression upon the subject of museum labelling in general, for it is a subject of the greatest importance, and could be illustrated by reference to many museums and several flourishing industries, some of which I have had an opportunity of inquiring into, in company with my friend in the chair, who feels with me, as I have reason to know.

I am glad to say that the work that we have been reviewing does not stop with England, but that more has been done already, still more being promised. Foreign collections of silver, such as those of Holland and Russia, are so little known, that some account of them will, at all events, be new to some members of the Society. The Education Department has, in the first place, succeeded in obtaining the use of most of the specimens of famous old Dutch art, especially of the days when the Van Vianens and Lutmas carried their craftsmanship to a pitch of technical perfection that has rarely been rivalled elsewhere.

In the spring of 1880, a loan collection of gold and silver work was arranged by the leading artistic and literary society in Holland—the Sociëtas Artis et Amicitiæ—in their rooms on one of the quays in Amsterdam. It had influence enough to collect many hundred examples of old Dutch art, most of the municipal bodies in Holland responding to the call, including those of Amsterdam, Rotterdam, Haarlem, Middelburg, Arnheim, Zwolle, Nijmegen, and others. The Royal Antiquarian Society of Amsterdam also contributed its treasures, and the famous collection of H.R.H. Prince Henry of the Netherlands was also placed at their disposal. No less than 24 out of the 97 plates in Van der Kellen's well-known portfolio of etchings of articles of Dutch art-work of all periods and kinds are of objects that were on loan at this time.

Though work of the craft in Holland for the three last centuries was well represented, as might perhaps be expected, there was little to show for any period anterior to the Union of Utrecht, and the Declaration of Independence—say, for the sake of a date, 1575.

In Burgundian times, the art had flourished chiefly in the Low Countries; all the goldsmiths of note in the 15th century seem to have dwelt in Gand or Bruges, and the most northerly place in which the art flourished was

Antwerp. Some attention was, however, paid to the regulation of the craft in Amsterdam and elsewhere by the Dukes of Burgundy and municipal authorities early in that century. The Dutch Government, in 1880, used all its influence to obtain the necessary permissions from the various owners, and in the result, some of the very best work in Holland is now at the disposal of the English student.

The great cup of the Arquebusiers' Guild, at Middelburg, is upon the table, and it is a work which will compare well with the most important standing cups of the reign of our Queen Elizabeth. I believe that since the copy was taken, the original cup has been sold by the municipality of Middelburg to a member of the Rothschild family for no less a sum than 15,000 Dutch florins, or £1,250.

The most popular form of Dutch cup in the 18th century seemed to be tazze, "drinkschalen," like the one which shows the face of William Courten looking through a barred prison window. It is Middelburg work of 1567. Courten was one of the victims of Alva.

The standing cups of the period must not be passed by without special mention of the cup formerly of the Brewers' Guild at Haarlem, now the property of the municipality. It is justly valued, and all the records relating to its making, in 1604, and cost have been carefully preserved. The group of St. Martin on horseback, with the beggar on the cover, is executed by Ernst Janss Van Vianen, member of a celebrated family, from a design by Hendrick Keyser, sculptor, of Amsterdam. The medallions on the side of the body, representing incidents from the life of the saint, were designed by Hendrick Goltzius, and, like the group, executed by E. J. Van Vianen, whilst the body of the cup, its foot, and cover, are the work of one Jacop Alckema, goldsmith, of Haarlem, whose mark, and the other Haarlem marks for 1604, it bears in two places. There is a fine "presentoir" of about this date from the municipal treasury of Amsterdam. It illustrates the luxury of the wealthy Burgomaster, who would not deign to receive his cup from the hands of his server, but had it handed in one of the costly and finely wrought stands or handles, called in Dutch "Bekerschroeven."

Of the year 1610, was a small cup of pure gold, belonging to Prince Henry of the Netherlands, the work of Paul Van Vianen, or De Vianâ, a still more famous artist than Ernst Janss Van Vianen; its body is chased with classical subjects, executed in very beautiful low relief. To him we owe, too, the figure of Atlas from the Trippenhuis at Amsterdam.

The most important pieces of all were somewhat later in date, being the splendid salvers, ewer, and candlesticks bequeathed to the Hospital for Incurables at Marssum, near Leeuwarden, in 1712, by its munificent founder, Dr. Popta. They are of earlier make, but they exhibit a mastery of the technical art of silver working that is almost matchless. They are by some Leeuwarden artist, whose name is unknown, his mark "meister-teken" is a cup, but the cartouches of the basin are designed by the same Hendrick Goltzuis who has been mentioned in connection with the Haarlem cup. A smith of wonderful skill, named Baardt, worked at Bolswardt. A specimen of his work is at our disposal this evening.

With these few and inadequate remarks, the interesting Dutch collection must be left for a more important subject (though not more important as matter of art history), viz., the Imperial treasures of Russia. Permission was in the same year, 1880, received from H.I.M. the Czar to inspect, and select from, the hitherto utterly unknown treasures of the Winter Palace, at St. Petersburg, the Imperial Museum of the Hermitage, the celebrated monastery of Troitsa, and, above all, the collection in the Kremlin, at Moscow.

Of those it was only known by rumour that they were rich in specimens of English plate, of great size and antiquity, some of them said to have been taken to Russia by the Czar, Peter the Great, himself from England; but they had never till then been examined by any expert, nor were their contents understood even by their own custodians. It was, therefore, full of eager curiosity that an expedition from England started on this interesting tour of inspection in the autumn of that year, our chairman and myself being of the party. To describe the collections that we eventually examined in detail would take much more than one paper to describe; suffice it to say that much massive English and other plate was discovered, but none that seemed to have been taken home to Russia by Peter the Great. The English specimens in the great treasury at Moscow seemed to have been presented by several English sovereigns, including Queen Elizabeth and her successors, the most modern of the pieces being from Charles II. on the occasion of the Restoration. These last were sent by the hand of his ambassador, James, Earl of Carlisle, in 1663—some of them are on the table of the Society this evening. The curious fact came to light, on a careful examination of the hall-marks on the English pieces in the collection called that of "The Patriarch of Moscow," also preserved in the Kremlin, that whenever a grand present had been sent to the Czar of Moscow, a corresponding but smaller offering had been presented to the Patriarch, showing the great importance of the latter office, and perhaps explaining its abolition by Peter the Great. Even now, the Holy Synod, which replaced the Patriarch, is addressed in the second person as "Your Holiness," and represents his personal authority over the Greek Church. The native Russian specimens were either very old or comparatively modern. The ancient are the golden ornaments that have been mentioned as Scythian, or Græco-Scythian, and are of a period far anterior to the Christian era; and the modern are the drinking bowls and ladles, called "Bratinas" and "Puisoirs" respectively, that almost exclusively represent the purely Russian art of the 17th century.

If we add to the English, Russian, and Dutch collections a number of the best known specimens of German, and a few of French work that have been recently acquired, the South Kensington Museum is within measurable distance of being able to show the foreign visitor a series of the best pieces of plate in the public and private collections in his own land, much more easily than he could see them at home, if, indeed, he could obtain access to some of them at all. Without having quite reached this point yet, we have, at all events, been able to sketch out the complete history of English plate-working, and to find out much about foreign work, as it is illustrated by reproductions of many of the very best specimens of the remaining work of the several countries that have been mentioned. These specimens can be arranged in strict chronological order, not only by their fashion, but by the aid of their hall-marks; and, even as far as it goes, the series is one the like of which is at the command of no other art or trade. No art-manufacture has a longer nor more distinguished history, nor one better worth the study of the present generation of craftsmen.

I will conclude by expressing a hope that future generations of English artists in the precious metals will take rank with the best of those which have preceded them.

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Notice to Correspondents.

All Letters intended for insertion in the current number should reach us by the 18th inst. We have been compelled to reject several interesting communications, owing to the space being occupied.

Mr. Cripps on the Art of the Silversmith.

TO THE EDITOR OF THE "WATCHMAKER, JEWELLER, AND SILVERSMITH."

Sir,—It is somewhat disappointing to find so able a writer as Mr. Cripps, whose valuable works, "Old English Plate," "Old French Plate," and "College and Corporation Plate," have met with so large a circulation, in opposition to reform. I was one of the few members of the trade who had the advantage of listening to his lecture at the Society of Arts, and it must be confessed that it was with astonishment that I heard doctrines propounded so diametrically opposed to the free-trade principles now recognised, as John Stuart Mill aptly puts it, by all "who have not lagged behind the general progress of opinion," as the basis of our manufacturing and commercial supremacy.

Mr. Cripps rightly values fine "old" English Plate. So does everyone who has an eye for the beautiful. The Mercers' Cup, the Barber-Surgeons' Cup, the Founders' Cup of Pembroke, the Poison Cup of Clare, the Boleyn Chalice, the Pepys Cup, and dozens of others now happily reproduced at South Kensington, are admirable. But Mr. Cripps had not a word to say in favour of modern plate. "It is not," says Mr. Cripps, "that shop windows are too empty, but too full of bad art." It is true that he comforted his audience by assuring them that neither France nor Germany has anything better to show; but, as far as this country is concerned, we seem, not without reason, to be in a sad way. I quite agree with Mr. Cripps. A more melancholy spectacle than a silversmith's window it is scarcely possible to conceive.

But, Mr. Cripps and I differ very materially as regards the means to be taken to remedy this state of things. Lectures won't do much good; manufacturers will not even take the trouble to go to hear them. South Kensington Museum, with all its treasures of art, has not attracted them as yet. The prizes annually offered by the Goldsmiths' Company, ludicrously described by them as "technical education," have accomplished nothing. Alas! what is to be done? According to Mr. Cripps, it is simple enough. The Government are to educate the people by means of models of ancient art; "owing to the want of educated taste and the stimulus that access to, and study of, the best models of other times would supply, the public have been contented with what they found ready made, and manufacturers have been well pleased to supply 'stock patterns' so long as the public were contented with them." And this, according to Mr. Cripps, is attributable to a "want of demand on the part of the public for what is better." There never was a greater mistake in this world. Will Mr. Cripps tell us in respect of what things, other than the necessaries of life, has demand created supply? Let him look round South Kensington Museum. Can he point to one single article in respect of which he can say that the demand for it created its supply? Did Benvenuto Cellini work for demand? Did Michael Angelo? Did Palissy? And then, one is led to ask, under what conditions did these men work? What system produced a Cellini, an Angelo, a Palissy? Freedom or constraint? Were their goods taxed, and were they hall-marked? Did they regard most the quality of the material upon which they worked, or the work which they brought to bear upon their raw material? Did Turner regard most the canvas upon which he painted, or the art expended upon the canvas? Did Gibson want a hall-mark on his marble?

But enough. Mr. Cripps knows as well as I do that these men would not have worked, could not have worked, excepting under conditions of absolute freedom. Neither should a silversmith be expected to do so. An artist will not. A mechanic may.

The plain fact is, that the English public have been taught to regard the quality of the material—silver—as the *ultima thule;* "How much does it weigh?" "How much is it per ounce?" "Where is the hall-mark?" Thus it is, as the *Saturday Review* properly said, that "a solid lump of silver is to be preferred to a modern centre piece." Art is dead. The Stag under the Oak, The Elephant and the Pine,—"The Admiration of 'Buttons,' and the Torment of some unfortunate youth who cannot see the pretty girl opposite to him through its tyrannous branches." Spirit of Ruskin—No. This is not "work made to last,—made with the man's whole heart and soul in it."

In conclusion, Mr. Cripps has an earnest desire to get the silver trade out of the "slough of despond" into which it has fallen. Let him take example of other trades—glass, furniture, brass work, papers, carpets, wall-decoration, I care not what; have not these trades made giant strides during the last thirty years? Take glass alone as an example:—does Mr. Cripps forget Dobson's glass in the 1862 Exhibition? Furniture: where are Gillows, Jackson and Graham, and others? Decoration: ask Mr. Crace:—"Did demand create supply, or supply create demand? Was there a demand for three hundred guinea glass claret jugs? Was there a demand for Jackson and Graham's five thousand guinea cabinet? And, is there not a cogent reason for the supply of those goods? Did the glass trade make giant strides before or after the application of free trade in glass? Should we have had Pears' Soap, if soap, like silver plate, had been everlastingly taxed, and at the mercy of a Worshipful Company of Soap-makers, albeit composed of "bankers, merchants, gold refiners, lawyers, and others?"

Freedom: that is what is wanted in the silver trade. Away with the exciseman. Away with old laws. They were made for dark ages, ages which have but little to commend themselves, if history be true. Freedom:—

> "'Tis that freedom of mind which no vulgar dominion
> Can turn from the path a pure conscience approves;
> Which, with hope in the heart and no chain on the pinion,
> Flies upwards aloft to the light which it loves."

I am, Sir,
Your obedient Servant,
EDWARD J. WATHERSTON.

Pall Mall East, London.
June 16th, 1883.

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Navy Silver Plate.—30,000 ounces of silver plate (forks and spoons) has recently been sold by order of the Government, under the following circumstances. The practice of the Navy has been that the commadding officers of her Majesty's ships have been supplied with silver and electro-plate under regulations and on payment of a per centage on the value. Of late years, however, since the improvement in the manufacture of electro-plate, commanding officers have preferred to draw it for their personal use, as involving less responsibility and less charge to them, consequently large quantities of silver have been returned into store. These stocks were collected and sold at a price slightly above the current market price of silver. Only about 20 per cent. of the silver was new, no silver having been purchased by the Government for some years past.

Uniform Meridian and Time.—At an early meeting thi year of the Paris Academy of Science, the French Minister of Public Instruction asked the opinion of that body as to the reply to be made to the proposal of the American Government for an international conference, with a view to the adoption of a uniform meridian and a universal time. The Commission appointed to consider the matter has expressed an opinion favourable to the conference, and has requested the Minister to appoint the members to represent France at the Washington Conference.

Poole's Keyless Mechanism for Hunting Watches.

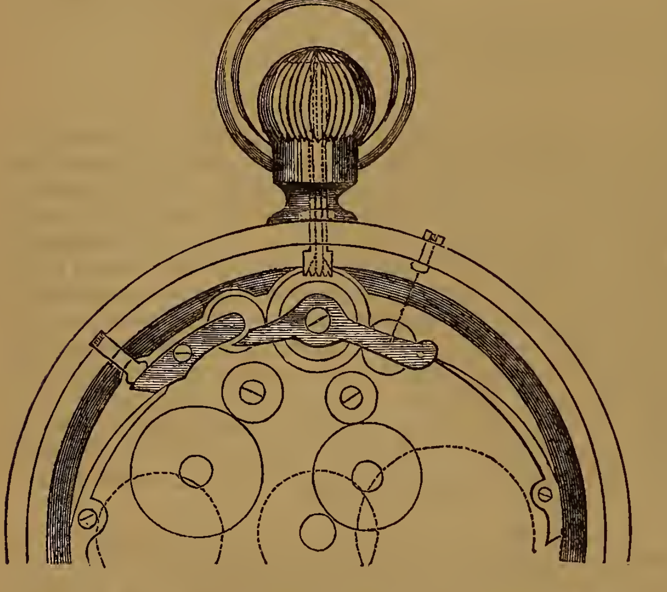
From the "Horological Journal," December, 1882.

FROM time to time descriptions of various forms of keyless mechanism for winding fusee watches have appeared in the *Horological Journal*; the first being that of Mr. Kullberg (Vol. XI.) and the second, that of Mr. David Keys (Vol. XII.) In Vol. XXII., two arrangements of Mr. Chalfont are described. All the above are excellent in their way, and many high-class watches, constructed on one or the other principles, are in circulation.

I first turned my attention to fusee keyless mechanism about seventeen years ago, and at that time it was very difficult to get work done out of doors, as the introducers of the various plans were able to keep their workmen employed in their own connexion; and most will remember that a number of very bad windings were made by out-door people, which had much to do with bringing fusee watches into disrepute. The plan of winding shown in the engraving has been in use for upwards of fourteen years, and, as far as my knowledge goes, has given every satisfaction.

It is so simple that little explanation is required, as its action is the same as a going-barrel winding, the wheels remaining in gear all the time that the winding is in progress; and thus the slipping, which is felt more or less in all "throwing in" windings, is avoided.

I need hardly say that there are two distinct things to be considered in the watch trade—the first being how to make a watch, and the second, how to sell it; and instances have been known in which an intending purchaser has taken a prejudice against a fusee keyless watch, because in winding it up very carefully he has felt it slip, whereas, had he done it carelessly, it might have been all right.



COVER, WHEN OPEN, ALLOWS WHEELS TO COME INTO ACTION.

There is no possible risk of this in the plan now shown; as the wheels stand, they are supposed to be shut off by the cover, which presses in a gold piece projecting beyond the bezel. This gold piece is the key of the position, and great care is required to make it fit easily and yet steadily. At one time I used to cut a notch right through the brass edge of plate, and keep it in position with a screw, acting in a slot; but a better plan is to make a hole as large as can soundly be got in, and put the shutting-off piece in from the inside. Some use a block with a steel pin put in from the outside, and cut through the edge of case, but this is objectionable; and one of the chief advantages I claim for my plan is that the frame and case are cut about as little as possible.

The set hands piece is shown projecting outside the case: I do not like locking arrangements. Sometimes, when this outside piece is objected to, I have made the rocking bar with arms of equal length, and placed the set hands wheel under a cock, which can be drawn back by a gold piece fixed to the tail, and wedged with the thumb-nail during setting.

As will be seen by the diagram, the seconds are at the VI o'clock, which seems the natural position, although a large number of keyless watches have them at the IX, and I have occasionally made them in that way with the same plan of winding. The shutting-off piece then comes on the opposite side, by the V; the intermediate winding wheel is a fixture, and the wheel which throws into the fusee wheel acts under a cock. The bar which keeps it back during setting hands passes over the intermediate wheel; one arm is unavoidably much longer than the other.

It is, of course, of the utmost importance that the winding pinion and button should turn freely on the pendant, and that the case spring (bridge lock) does not bind on the end of the pinion.

Although the plan appears so simple, it requires as much care to construct as an escapement; the button ought to move round without the slightest hesitation, by turning the fusee wheel, and it will not do this without the depths are perfectly correct. Once right, they cannot get wrong.

Of late years many ingenious and complicated contrivances of other makers have come under my notice, only in the majority of cases the work has been more or less spoilt by jobbers, in endeavouring to correct some fault either in the winding or setting, the cause of which they did not thoroughly understand.

A few months since a firm of City solicitors sent up a fine keyless watch for examination, concerning which an action at law was pending. It occasionally slipped very unpleasantly while winding, and the purchaser had formed the idea that because the fusee squares were left on, it was an old watch "converted," and that the mechanism was a makeshift. I think it would be interesting to reproduce the questions as given:—

"The points upon which you are to report are whether the watch was originally made a keyless watch, or was merely converted into a keyless watch after having been made differently; also whether the conversion (if any) was properly and successfully done, so as to make the watch as valuable, durable, and good as if it had originally been made keyless.

"We shall be much obliged by your adding your opinion whether a customer purchasing a keyless watch would be understood in the trade to purchase a watch originally made as keyless."

My reply was, that the watch had been originally made as keyless; that the mechanism was on a popular principle, and that occasional slipping was unavoidable.

This was presumably satisfactory, as I heard nothing more of the matter; only it shows what curious ideas the public often have on horological topics.

One point more before closing. When asked why a fusee watch is so much more expensive than a going barrel, I always refer to the advantage of having the up-and-down index, and also to the fact of the watch being perfect in itself, without the keyless mechanism. The going barrel is adopted in fine watches as an accommodation to suit the other parts of their construction.—James U. Poole.

The following correspondence is also reproduced.

To the Editor of the "Horological Journal."

Sir,—The letter from Mr. Poole which appears in last month's *Horological Journal*, while giving a very clear description of the keyless work of which he most approves for hunting fusee watches, seems scarcely explicit enough on what some persons may consider a defect in the principle, namely, the liability of the watch to stop when the cover is left open, and the keyless work allowed to remain in action for any length of time.

No doubt the purchaser is told that he must close the cover after winding; but the necessity for so doing might be urged as a defect, seeing that some gentlemen have a habit of leaving their watches open on the desk before them while writing, and with this keyless work they would be debarred from so doing. Others put the watch under the pillow at night, and, in a moment of drowsiness, the cover might be left open through the lock spring not being made to snap before replacing the watch, in which case, the pillow catching the button, would no doubt hasten the stoppage of the watch.

As the system has been known to other manufacturers for a number of years, but has not been generally used by them, I conclude that the foregoing objections have had weight either with them or their customers.

It may be remarked that if the keyless work is made as carefully as Mr. Poole desires, it will not stop the watch even if allowed to remain in gear: but this does not dispose of the objection that the slightest hold upon the button would infallibly do so, however well it might be made; besides which the thickening of the oil, which unfortunately takes place so often in a few months, is a point worth consideration.

Arthur Wm. Webb.

90, High Street, Islington, N.

Sir,—It is with much pleasure that I take up my pen to reply to the letter of Mr. A. W. Webb on the above subject, as the objections he makes are precisely such as I should have advanced myself had I not been practically acquainted with the working of the mechanism; in fact, I should have asked you to have published the description ten years ago, only I was anxious to have it tested in every possible way.

Unquestionably if the button is fixed, the watch will stop; but, as a matter of fact, no complaint has arisen to my knowledge after one has been delivered to a wearer. It is the safest plan to time without the shutting-off piece being used, and then any defect has an opportunity of manifesting itself. I have, for experiment, allowed a watch to remain with the cover open for a week, without affecting its performance, the motion of the button being so slow; and with regard to a person forgetting to shut the cover down at night, in a moment of drowsiness, it should be remembered that a hunter requires a distinct effort to open it and see the time—the shutting follows almost mechanically.

Unfortunately the sale of such watches is extremely limited, as only the highest class of keyless have fusees; and for presentation purposes they have been almost entirely superseded by complicated watches, such as repeaters and chronographs; but out-door keyless makers say that a considerable number, with mechanism as described, are about the trade, and this has influenced me in making it public now.

It is very much the custom of manufacturers to deliver watches with the cases plain, which are subsequently engraved by the retailers; and a keyless case never ought to be passed as received from the engravers, because they get it polished without removing the button and winder, and the rouge penetrates through in a surprising manner. The pendant holes must be perfectly clean, and the winder oiled with watch oil; and this applies to all forms of fusee windings, not one of which is free from some objection.

Even if the shutting-off action is automatic, the button has to make a slight movement, which it cannot do if it is stiff; and I have seen watches which stopped every time after winding, solely from this cause.

The pinion acts more freely, as a rule, in a bridge-lock or "saddle"-case spring than in those which are notched out to receive it; and I prefer the action of the former as having a longer push, and being thereby safer.

I do not think that I need say any more on the subject at present, as most of the points were covered in the original description, which your readers will no doubt refer to. Supposing that several plans are equally good, the simplest ought to have the preference, and I do claim superiority on that point.

James U. Poole.

33, Spencer Street, E.C., February 1883.

[We have published the above, as a sequel to the papers on English Keyless Mechanism, which appeared in Vol. VII. of this Journal. —Ed.]

Extracts from the Astronomer Royal's Annual Report.

The number of chronometers now being tested at the Observatory is 154. Of these, 114 (77 box-chronometers, 16 pocket-chronometers, and 21 deck-watches) are the property of the Government, and are being rated after repair, previous to their issue to the Navy. The remaining 40 are placed here for the annual competitive trial, and of these 8 are fitted with Airy's supplementary compensation. In addition to the above, 5 chronometers have been tested here for the new Hong Kong Observatory.

The first 6 chronometers in 1882, as tested by their trial numbers, are, on the average, better than the first 6 in any year since 1873, and the first chronometer* performed better than any we have had previously on trial. The trial in cold was, however, not quite so severe in 1882 as in preceding years.

There has been no case of failure in the automatic drop of the Greenwich time-ball. On three days the ball was not raised on account of the violence of the wind.

The Deal time-ball has been dropped automatically at one o'clock on every day throughout the year, with the exception of 5 days, on which there was failure in the telegraphic connexion; of one day when the ball was accidentally dropped 4 seconds too soon by telegraph signals, and of 14 days when the current was weak and the trigger was released by the attendant, without appreciable loss of accuracy. On 12 days the ball was not raised on account of the violence of the wind.

Mr. Leonard has expressed a wish to make other arrangements for the dropping of the Deal ball, as he proposes to use for another purpose the wire from Greenwich to London Bridge, by which time signals are sent to the South Eastern Railway, and the Deal ball is dropped independently of the signals sent to London by the Post Office wire. It has been ascertained that the Deal ball could be dropped through the Post Office connexions, and a return signal to Greenwich given; but no further step in the matter has yet been taken.

The Westminster clock has maintained its high character, its errors having been under 1 second on 66 per cent. of the days of observation; between 1 second and 2 seconds on 25 per cent.; between 2 seconds and 3 seconds on 6 per cent.; and between 3 seconds and 4 seconds on 3 per cent. The error has never exceeded 4 seconds.

The mean temperature of the year 1882 was 49°·6, being 0°·1 lower than the average. The highest air temperature was 81°·0 on August 6th, and the lowest 22°·2 on December 11th. The mean monthly temperature was above the average from January to May, then below until September. In October, November and December it differed little from the average.

The number of hours of bright sunshine recorded by Campbell's sunshine instrument during 1882 was 1245, which is more than 40 hours above the average of the five preceding years.

The rainfall in 1882 was 25·2 inches, being very slightly above the average.

In the year ending 1883, May 20th, photographs of the Sun have been taken on 200 days, and of these, 339 have been selected for preservation. There were 7 days on which the Sun's disc was observed to be free from spots. The number and size of spots and faculæ continued to increase in a marked way till last November, when a group of spots of very unusual size appeared. Since that date, however, the Sun has become more quiescent.

It was suggested in the last report that the measurement of such of the Indian and other photographs as were required to fill up gaps in the Greenwich series might, with advantage be undertaken here. This proposal has now been carried out, and 111 photographs for the period from 1881, December 22nd, to 1882, October 19th, have been received from the Solar Physics Committee, so that a record of the condition of the Sun on 279 out of the 302 days in that interval is now presented. From 1882, October 20th, eight-inch photographs were taken in India, and for the measurement of these a special micrometer has been ordered of Messrs. Troughton and Simms, by the Solar Physics Committee.

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* Mr. Kullberg's.

The duties of the establishment are distributed thus among the staff.

Mr. Dunkin (chief assistant) superintends generally all the work of the Observatory. Mr. Criswick (first-class assistant) has charge of the transit-reductions and miscellaneous computations. Mr. Downing (do.) undertakes the circle reductions. Mr. Thackeray (second-class assistant) has the care of the library and manuscripts, of the chronographic transits, and of stores and stationery. Mr. Lewis (do.) has the charge of the time department, including chronometers, and of the money accounts. Mr. Hollis (do.) is charged with the altazimuth-reductions, and with the measurement and reduction of the Indian photographs. Mr. Maunder (do.) superintends the spectroscopic and photographic reductions. In the Magnetic and Meteorological branch, Mr. Ellis (first-class assistant) has the general superintendence of the work, Mr. Nash (assistant) being specially charged with the meteorological reductions, and with the care of the instruments.

There are eight or nine computers usually attached to the Astronomical Department, and three or four to the Magnetic and Meteorological.

In some slight degree the past year has been one of transition and of preparation for future work. Some administrative changes have been made, and the observers have been gaining experience in some new directions; but the regular course of observation and reduction has not been disturbed, and the standard meridian observations, have, by the assiduity of the staff, been maintained in full vigour.

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Historical Notes of Voltaire, as Watchmaker.

THE following was first published by Dr. F. Gerlier, of Ferey, in a local paper of one of the Eastern departments of France, on the occasion of the centenary of Voltaire. By reason of the world-wide reputation of Voltaire, it may be of some interest to the readers of the *Watchmaker, Jeweller, and Silversmith* to know something of his relationship to the trade it represents.

Although various and exhaustive biographies have been written of Voltaire, the facts concerning his transactions as a "Watchmaker" have not been noticed.

If a man of letters were to examine his correspondence after the year 1770, he would be surprised to find what tact he displayed, and attention he devoted to the advertising of his watches. We have paid careful attention to those points in his letters which throw any light on the development of the watchmaking industry of Ferney, and explain the means by which it became possible for this colony to become, in a period of two years, a centre of a manufactory which sent its goods to all parts of the world. True it is, that its prosperity was only of short duration, and that with the departure of Voltalre, the prosperity of Ferney passed away also. Nevertheless, this enterprise is deserving of closer attention, to show with what enthusiasm he patronised the watchmaking colony of Ferney.

At the end of the last century considerable disturbances prevailed in Geneva, the native place of watchmaking. Not only was the right of citizenship denied to some of the natives, but their civil and social relationship suffered great oppressions; they were not allowed to transact business, or even to offer their productions for sale.

When, in the year 1770, fifty of these persecuted watchmakers were expelled, they took up their residence at Ferney, where Voltaire accorded them his protection. These people, who had brought nothing with them than their two hands, commenced here to practise their vocation, agreeably to the instruction of Voltaire. But as it was as necessary to sell watches as to make them, Voltaire displayed an activity in the interest of his colony which is surprising, and shows the resources of his inventive genius.*

As courtier, he was well aware that court favours were indispensable to the undertaking. In those days the Sovereign alone granted patents, dispensed Abbeys, created peers, gave pensions, privileges, ordered release and imprisonment, &c. in fact; he was an Autocrat, and therefore, the favourable attention of the King was necessary, in order to enable the watchmakers of Ferney to compete with older and better organised manufactories. But as Voltaire, to his bitter experience, was in correspondence with all the Kings, the King of France excepted, it was desirable for him to use by-paths, to obtain royal patronage. Accordingly, he wrote to the Duchess of Choiseul, six weeks after the arrival of the Geneva watchmakers, as follows:—

FERNEY, FAUBOURG DE VERSOIX,
11th May, 1770.

> "I venture to take the liberty to submit to the Duchess the six watches which we have made at Verney. We consider them very good and handsome, a quality which, by the by, every author claims for his work. Their low price will undoubtedly suit the Abbé Terroi, as we make watches at eleven Louis d'or apiece; even the most expensive, richly set with diamantes, cost not more than forty-seven Louis d'or, The one with the likeness of the King in enamel, set with diamantes, is twenty-five Louis d'or; and the other with the likeness of the Crown Prince, and hands set with diamantes, seventeen Louis d'or. All these watches would be at least one-third dearer in Paris. We are working with the greatest economy, and shall certainly merit the attention and patronage of the Minister."

This communication was well accepted, and a very gracious reply given to it. The two likenesses show the skill of the artist, but Voltaire was not the man to rest satisfied with this achievement. The 25th day of August came round, and with it the day of St. Louis and the Festival of the Kings of France.

The Geneva emigrants honoured the festivities by a banquet (no doubt by reason of higher wishes) as a proof of their gratitude to the Ministry.

The inhabitants of the place, very partial to amusement, took part, of which strict observation was taken, and as early as the 27th of August, Voltaire wrote to the Duchess of Choiseul.

> "It will be a matter of satisfaction to you to know that our Emigrants originated some small festivities in honour of the day of St. Louis, which ended in a banquet of a hundred changes, an illumination, and abundant cheers for the King. It was a pleasure to see our Papists and Huguenots on such good terms."

After this event it was hardly possible for this powerful Ministry to lose sight of the little colony of Ferney, which showed such devotion to the honour of the King and welfare of the country; it felt impelled to support such faithful subjects with a few orders.

Voltaire was able to say: "The Duke of Choiseul favours my factory as much as possible. I am patronised by the King, but above all by the Duke of Choiseul."

(To be Continued.)

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* It is not to be supposed that Voltaire ascribed any credit to himself, or made capital out of it for himself, by calling himself "Watchmaker to the King," although he was just as well entitled to it as some modern adventurers in the watch trade. It was left for our own time to perfect this imposition and cheat; may it also see its finish.

Galileo, and the Invention of the Telescope.

Galileo's part in the invention of the telescope, and the merit due to him, clearly appears from the following extract of the answer given by him, in the "Saggiatore," to Padre Orazio Grassi, a Jesuit. "The share of credit that may be due to me in the invention of this instrument (the telescope) and whether I can reasonably claim it as my own offspring, I have expressed in my 'Avviso Sidereo,' which I wrote in Venice. I happened to be there when the news reached me that a Dutchman had presented Count Maurice with a glass, by means of which things far away appeared just as clearly as if they were quite close at hand, but without any detail being mentioned. Upon hearing this, I returned to Padua, where I was then living, and pondered over this problem, and the first night after my return I found it out. The following day I made the instrument. After that I immediately set to work to make a more perfect one, which being completed six days afterwards, I took to Venice, where so great a marvel attracted the attention of almost all the principal gentlemen of that republic. Finally, by the advice of one of my dearest patrons, I presented it to the prince in presence of the college. The gratitude with which it was received, and the esteem in which it was held, are proved by the ducal letters which I have still preserved, since they bear witness to the generosity of His Serene Highness in confirming me for life in my lectureship of the studio of Padua, with double the payment of that which I had had beforehand, which in its turn was more than three times what any of my predecessors had enjoyed. These facts, Sig. Sarsi, did not take place in a forest or in a desert, they occurred at Venice, and if you had been there then you would not have put me down simply as a foster-parent of the invention. But perhaps some one may tell me that it is no small help towards the discovery or solution of any problem to be first of all apprised in one way or another of the truth of its conclusion, and to know for certain that it is not an impossibility that is being sought after; and that, therefore, the information and the certainty that the telescope had already been made, were of such use to me, that in all probability I should never have made the discovery without them. To this I answer that the help given me by the information I received, undoubtedly awoke in me the determination to apply my mind to this subject, and that without it I should very likely never have turned my thoughts in that direction; but besides this, that I cannot believe that the notice I had had could in any way render the invention easier; and I say moreover, that to find the solution of a problem already thought out and expressed requires far greater genius than to discover one not previously thought of; for in the latter case, chance can play a great part, while the former is entirely the work of reasoning. We know that the Dutchman, the first inventor of telescopes, was simply a common spectacle-maker, who, handling by chance glasses of various kinds, happened at the same moment to look through two, the one concave, the other convex, placed at different distances from his eyes, and in this manner he observed the effect which was produced, and thus invented the instrument; but I, warned by the aforesaid notice, came to the same conclusion by dint of reasoning; and since it is by no means difficult to follow, I should like to lay it before you. This, then, was my reasoning; this instrument must either consist of one glass only, or of more than one glass, it cannot be of one alone, because its figure must either be convex, or concave, or comprised between two parallel superficies, but neither of these shapes alters in the least the objects seen whilst increasing or diminishing them, for it is true that the concave glass diminishes, and that the convex one increases them; but both show them very indistinctly, hence one glass is not sufficient to produce the required effect. Passing on to two glasses, and knowing that the glass of parallel superficies has no effect at all, I concluded, therefore, that the desired result could not possibly follow by adding this one to either of the other two. Hence, I restricted my experiments to combinations of the other two glasses, and I saw how this brought me to the result. Such was the progress of my discovery, in which you see of how much avail was the knowledge of the truth of the conclusion. But Sig. Sarsi, or others, believe that the certainty of the result affords great help in producing it and carrying it into effect. Let them read history and they will find that Archites made a dove that could fly, and that Archimedes made a mirror that burned at great distances, and other admirable machines. Now by reasoning on these, they will be able with very little trouble, and very great honour and advantage, to discover their construction, but even if they do not succeed, they will derive the benefit of being able to certify themselves that the ease of fabrication which they promised themselves from the pre-knowledge of the true result was much less than they had imagined."

We must add that many of the principal persons in Europe were anxious to have Galileo's telescopes, and that he sent presents of them to the Grand Duke of Tuscany, to Prince D. Antonio de' Medici, the Elector of Bavaria, the Emperor Mathias, Cardinal Borghese, the Queen of France, the King of Spain, the King of Poland, the Landgrave of Hesse, Giuliano de' Medici, Cardinal Del Monte, Cardinal Montalto, to the Dukes of Acerenza, and of Acquairva, &c., &c.; he also sent some to Holland, whence Constantine Huygens writes in 1637, that it was impossible to find artificers in that country having skill enough to make telescopes of sufficient power to observe the satellites of Jupiter.

The principal discoveries made by Galileo by means of his telescope in chronological order, are as follows:—

He first of all observed the cause of the lunar spots, recognising in them the effect of shade produced by the heights which must exist upon the Moon, and thus proving that it was covered with mountains and table-lands; and he pointed out the way for determining their heights. He likewise perceived that the secondary light transmitted to us from the Moon proceeds from the reflection of the solar rays from the surface of the earth to that of the Moon.

Directing his telescope towards the Milky Way he was the first to certify the fact that it was composed of myriads of stars.

On the 3rd of January 1610, he discovered that three secondary planets revolve round Jupiter, and on the 13th of the same month he found the fourth. He named these satellites the "Stelle Medicee." He showed that they, in revolving round Jupiter, underwent eclipses, just as our moon does. He determined the length of their rotations, remarking that by their means it is possible to observe 1000 eclipses a year, which would be of great utility for finding the longitude of any place.

In the month of August 1610, whilst observing Saturn, he noticed that it appeared to be continually accompanied by two planets which touched it at the extremities of the same diameter, so that he called it *tricorporeal.*

In the same month he first saw the spots on the Sun, determined the direction of their motion, and, with happy intuition, compared them to terrestrial clouds.

On the 30th September 1610, he found that Venus changed figure like the Moon, so he called it *horned* (*la falcata*).

He likewise observed Mars and its phases, and reasoned admirably upon the comets.

Taking his stand upon these astronomical observations, Galileo embraced, maintained, and defended the system of Copernicus, so that he had to undergo the cruel persecutions of Rome, which compelled him to utter that recantation, at the end of which he broke out into the now celebrated exclamation, "*Eppur si muove!*"

Assaying Gold and Silver, as practised at the Royal Mint.

The process of gold assaying comprises six distinct operations.

1*st Process.*—The portion of metal to be assayed is adjusted to an exact weight by cutting and filing. Such accurately weighed portions of alloy are wrapped, together with definite weights of pure silver, in capsules of lead foil, and placed in order on a tray.

2*nd Process.*—The packets are transferred to porous cups or "cupels" of phosphate of lime, which are arranged in rows, in a muffler or small oven, which is fixed in a suitable furnace and maintained at a bright red heat. The lead oxidizes and is absorbed by the cupel, together with the copper and other oxidizable metals present, and the silver and gold remain behind in the form of a button, which may also contain platinum, iridium, or other metals possessing similar properties.

3*rd Process.*—These buttons are hammered out into discs, which, after being annealed, are rolled into thin strips, and these are again annealed and bent into loose coils or "cornets." The annealing takes place in an iron tray.

4*th Process.*—The cornets are placed in small perforated cups of platinum arranged in a perforated tray of the same metal. The whole is then introduced into a platinum boiler, which contains boiling nitric acid of specific gravity 1·25, in which it is allowed to remain for 15 minutes; it is then transferred to a similar boiler with acid of specific gravity 1·4. The silver is removed by the action of the acid, and the gold remains in a spongy state.

5*th Process.*—The gold sponge (which retains the original form of the cornet) is rendered coherent by annealing at a dull red heat. This is accomplished by introducing the platinum tray into the muffle.

6*th Process.*—The final operation consists in weighing the cornets. This is done in a specially constructed "assay" balance, which is capable of indicating about $\frac{1}{3000}$th of a grain when loaded with 7·5 grains in each pan. The weights employed bear a decimal relation to the original weight of the piece of metal operated upon. The percentage of gold, therefore, present in the alloy, is at once indicated without calculation. The weighing in the first process was of course conducted on the same or a similar balance.

The assay of silver can be conducted by cupellation, an operation similar to that already described in the 2nd process of the assay of gold, the only differences being that no pure silver is added to the assay piece, and the operation terminates when the button has been obtained and weighed. The wet method of Gay Lussac is, however, now usually employed for the assay of silver when the "standard" is approximately known, and the alloy contains not less than 50 per cent. of silver. It consists in precipitating the precious metal from the solutions of a known weight of the alloy to be assayed, the weight being so adjusted that sufficient silver is present to neutralize a given volume of the solution employed as a precipitant. This solution is usually one of common salt, but hydrochloric acid or hydrobromic acid may sometimes be used with advantage. The assay pieces, having been carefully weighed, are placed in numbered bottles, and a definite amount of moderately dilute nitric acid is added to each, the bottles being then moderately heated to assist solution. The standard solution is then carefully introduced by means of a pipette, and the bottles are vigorously shaken until the precipitate coheres and the solution becomes clear. A cubic centimetre of "decimal" solution, which is $\frac{1}{10}$th as strong as the "standard" solution, is then added to each bottle, and they are again shaken. This is repeated until the decimal solution produces either no cloud or a very slight one. This indicates the conclusion of the operation, as the amount of silver present can be calculated when the weight of salt which is required to saturate it is known.

Trade Notes.

We have no special events to chronicle this month, business in all departments of trade having been exceptionally depressed; stocks large, and money scarce. There is, however, plenty of the latter in reserve, and only wanting a little encouragement to be put into circulation. We daily expect better times, and so they do in America, where we learn from a reliable source that the spring trade has been disheartening to everybody.

* * *

In our last issue we referred to an official visit paid to the School of Horology in Paris. Since then M de Hérédia, Deputy of the Seine, has been offered and accepted the Honorary Presidency, and in that capacity will present the prizes to the successful students on the 8th inst., in the grand hall of the palace of the Trocadero. This "solemnity" (as it is termed) will be followed by a concert.

* * *

Sir Edmund Beckett, the President of the British Horological Institute, is to be requested to perform a similar office at the Half-Yearly General Meeting on the 17th inst. Some half-dozen youths await opportunities to commence a course of instruction, and the enlargement of the building is under the serious consideration of the Council.

* * *

During the time of the French Revolution and the Reign of Terror, a determined attempt was made by the Convention to "decimate" the periods of time, in order, it was said, to obliterate all traces of the seventh day of rest, as prescribed by the Christian religion. The Marquis Turgot, says the *Revue Chronométrique*, possesses a number of watches and clocks specially made at that period, showing ten hours, and one hundred minutes and seconds.

* * *

Sir John Bennett's celebrated clock watch, the appearance of which, since the robbery, must be familiar to the countless passers by of his establishment in Cheapside, has been recovered by the police, but in a sadly deteriorated, or, according to Sir John, "transmogrified" condition, the whole of the enamelling of the case having been taken out, and the number and name removed. It was found on the person of a man who is charged with stealing a quantity of precious stones to the value of £2000, from the premises of John Garritt, 20, Baker Street, Clerkenwell.

* * *

A large clock has just been erected in Frilwood Church, Sheffield, by Messrs. John Smith & Sons, Midland Steam Clock Works, Derby. It strikes the hours upon a large bell, chimes the quarters, and shows time on one 5-feet dial.

Kabyle Jewellery.

IN Kabylia the jeweller's art is a very ancient and honourable history. Working members of the profession are found in all the tribes; but perhaps the Aït Yenni are the most celebrated for the number and beauty of their patterns, the industry having been concentrated and developed among them. Silver is the only precious metal used; they have never worked in gold. Crucibles for the use of jewellers are made of a particular kind of clay found in the country of the Aït Yenni, and the paste formed of this clay is mixed with hair to give it greater strength. It is possible that the Aït Yenni tribe owe their pre-eminence in this art to their almost exclusive possession of the clay suitable for the manufacture of crucibles. The operation is commenced by melting down silver coins, especially (if they can be had) ancient Spanish "douros." For some kinds of jewels the silver is kept pure; for others it is mixed with an alloy of zinc and tin, a sort of barbaric silver which forms a good strong metal, much better for constant wear than pure silver, and capable of receiving a very high polish, which, however, is generally reserved for the filigree ornamentation and the little beads imitating pearls—the Kabyles showing their artistic instincts by preferring to keep the flat parts of the trinket either oxidised dark, or covered with coloured enamel. Dealers in Algiers always tell you these jewels are made of "metaille," thereby saving their consciences from the shadow of falsehood.

After melting, the silver or metal is hammered on an anvil, and made into plates of different thicknesses; it is also fashioned into wire of various sizes—for rings, chains, and other kinds of ornament—which are sometimes twisted for enamelled jewels. The ornaments may be divided into two classes; those enamelled in colours, and those destined only to be decorated with coral, or filigree work made by arranging the twisted wires into countless varied designs on the flat silver plates. The first always have a plaque of metal made in the required shape, on which are fixed twisted wires in the pattern chosen, thus forming a closed-in space intended to receive the enamel, the bits of coral, and the bright spots of metal intended to represent pearls. The wires are fixed in their places with little pincers, and then made to adhere by means of a solder formed of two parts of silver, one of brass, and one of arsenic of sulphur. This solder reduced to powder is placed around the object to be set; the plaque is then heated; and as the solder melts at a lower temperature than the metal, the join is easy. The foundation of jewels made by this method must be of silver with less alloy than the solder, or the whole trinket would melt. The common jewels sold at very low prices, which are generally made of brass washed over with zinc or tin, have ornaments so slightly fastened that they are constantly dropping off. To solder silver the Kabyles employ a substance formed of one part sulphur of arsenic, one part bitartrate of potassium, and one part of brass, melted together, to which is afterwards added by a second fusion two parts of silver. The enamels used are bought in Tunis or Algiers, and are of European make. They are four in number: one of a transparent blue, coloured with oxide of cobalt; a second, transparent dark green, due to the oxide of chrome; the third, of light opaque green, obtained from bi-oxide of copper; and the fourth, of an opaque yellow which has for a base chromate of lead. Reduced to fine powder and mixed with water, these enamels are spread in thin layers on the beds prepared for them; the jewel is then exposed to the proper heat; and the enamel is fixed by melting. This process, by which extremely beautiful results are obtained at a very moderate price, might be easily imitated at home. Pieces of coral are similarly fixed in their places with wax, and are fastened their by pressing down the overlapping bits of metal round them. The unenamelled trinkets are as varied as the caprices and fortunes of their makers.

The principal jewels made are double shoulder pins joined together by a chain—often with an amulet in the middle—used for fastening the dress on the shoulders. A Kabyle woman's dress owes very little to the art of the dressmaker. The bodice is formed anew each morning, by being secured on the shoulders by these pins, which are generally alike (Fig. II.). In our illustrative portrait two patterns are given. They are always very classical in shape; and sometimes the pins are of such large dimensions that one is not suprised to read how the Greek women stabbed a man to death with the pins of their brooches. Brooches are of many different forms and sizes (Fig. II.). The large round brooch with hanging chains and ball pendants is only worn after a woman has borne a child, and even then with a difference. Thus the mother of a daughter wears hers in her bodice, but the proud mother of a son sets hers in the middle of her forehead, with the balls falling over her eyebrows. From this honoured position it is sometimes torn off, and flung in rage and defiance at the feet of the husband, when some domestic difference of opinion has induced him unduly to chastise her. Some brooches present exactly the same shape as those still worn by old Highland women. It is strange how much signifioance is yet attached to these ornaments; her brooch is the last thing a Highland woman can be persuaded to part with. Ear-rings (Fig. III.) are made of many different patterns. Some are small, to hang from the lobe of the ear; some are very large, to hook over the ear, supported by strings tied at the top of the head under the head-dress. The long dangling chains which always hang from these large ear-rings are decorated at intervals with bits of rough coral and coloured glass beads imported from Europe, and often end in little pointed bits of polished cornelian. Long dangling chains and drooping ornaments are a great feature in Kabyle jewellery, and in that of Bedouins. The negro replaces chains and beads with long strips of coloured leather and white shells; but the decorative feeling is the same in all these neighbouring nationalities. Even in the beautiful jewellery of the Moorish Arabs you see delicate drooping gold chains and pendant pearls. Waist-clasps are worn of many different kinds. In addition to the usual filigree work they are sometimes ornamented with silver inlaid on metal. At times they assume such formidable dimensions as to look almost like small shields. Their usual form is round, but many varied and sometimes very elegant shapes are seen.

The turban head-dress is usually made of silk scarves, most commonly black, and twisted into varied forms. The diadems worn, as may be seen by our picture of a Kabyle beauty, are very handsome and original; they are usually made of three plaques of metal joined together by semispheres of bright metal, which have a very striking effect. The plaques are always enamelled and enriched with rounded pieces of coral set in rows, much as in a Jewish high-priest's breastplate. The diadem is placed round the turban-shaped head-dress, and supported in its place by means of small hooks, which fasten on to the top of the turban. A row of various pendants dangle over the eyebrow. Amulets form an important item of a Kabyle woman's possessions; they are sometimes large and square, containing a written charm, usually a prayer from the Koran, and are attached to the side by long chains like a chatelaine (Fig. IV.). Sometimes they are round or oval, and contain perfumes. Bracelets (Fig. VI.) are found of innumerable shapes. Some are made of a band of metal four inches wide, fitted to the arm, and ornamented with rude *repoussé* work. Perhaps the greatest care and wealth of fancy are bestowed on the necklaces. They mostly consist of charms hung from chains. A large richly-worked amulet forms the centre, with many smaller ones around. No doubt these charms all mean something, and have each a special function in preserving their owner from harm. Toads and fish are common; sometimes we have a butterfly, a vase, a triangle, a flower. Many forms of the cross are seen, perhaps introduced by Christain slaves (who oftened escaped from Algiers into the mountains), or due to still earlier Christian tradition. Pistols daggers, and the conventional sign known as the Hand of Mahomet, often appear; to these are added coral and amber beads, coins, bits of glass or cornelian, bright-colured pebbles, scraps of mother-of-pearl, or shells, or even coloured seeds, besides numbers of those glass beads, which commerce has been pouring by boat-loads, in almost an unbroken stream, into Africa ever since the days of the Phœnician merchants.

A Kabyle woman's jewellery belongs entirely to herself, and cannot be claimed by the husband in case of a divorce. Naturally she is extremely particular about its shape and quality. It is generally made to order. The purchaser sends the money necessary for the article he requires; the workman furnishes the brass, coral, and enamel; he then takes for his share one half of the silver sent; for jewels without coral or enamel, the payment is the eighth or tenth. It is said that people are now too poor to order such handsome ornaments as were once worn, but the workmen are still quite capable of executing any orders given to them.

To be Continued.

Patents.

BRITISH PATENTS.

Applications for Letters Patent.

2,605. William Henry Douglas, of Stourbridge, in the county of Worcester, Watch Maker, for an invention of "Improvements in Chronographs."

2,950. George Henry Jepson, of 21, Addle Street, in the City of London, for an invention of "Improvements in Fasteners for attaching buttons, medals, jewellery, watches, and other moveable articles to clothing, hangings, and other goods made of textile fabrics, and for other purposes."

FOREIGN PATENTS.

France.

146,136. Lioret, for "An Alarm-Watch."

150,584. Bouchon, for "Chains, Necklaces, &c."

151,219. Lobre, of Caudrot, for "A Watch-Stand."

151,484. Favre-Heinrich, of Besancon, for "Improvements in the Barrels and Fusees of Watches."

151,524. Quinche Brothers, for "Obtaining Links of Chains, Necklaces, &c., by Pressure."

151,156. Moche and Co., for "Annular Manufacture of Serpent Chains for Necklaces, Braclets, &c."

151,587. Vissiere, for "A compensating Balance for Chronometers and other Time-Keepers."

151,701. Merle, for "Manufacturing Jewellery."

151,758. Silberberg, for "A Motor worked by the variation in the length of Metals employed in Clock-Works."

151,772. Bell, for "Hands of Watches."

151,777. Rancher, for "A Combined Watch and Compass."

151,778. Sander, for "Manufacturing Coloured Glass for Mosaics and Jewellery."

151,915. The Standard Time Company, for "Transmitting Impulsion by Gas for obtaining Synchronism in Clocks."

151,931. Speckhart, for "An arrangement of Watches."

151,950. The Standard Time Company, for "Rendering Clocks Synchronous."

152,005. Gay, for "A so-called 'Revolver-Watch.'"

152,071. Lion, for "Manufacturing Bracelets, Necklaces, Chains, &c."

152,108. Rayer, for "A Spiral Spring for fixing Jewellery, &c."

152,283. Herice, for "Bracelets."

152,382. Mrs. Redier, for "Clocks."

152,478. Beccarelli, for "A Clock-work."

152,552. Goy-Golay, for "A Chronograph with a Minute Counter."

United States of America.

273,759. Theodore Mueller, of Philadelphia, Pa., assignor to Thomas B. Hagstoz and Charles N. Thorpe, both of the same place, for "A Watch-Case."

274,324. Vitalis Himmer, of New York, assignor to the Time Telegraph Company, of the same place, for "A Circuit-Controller for Electric Clocks."

274,325. Vitalis Himmer, of New York, assignor to the Time Telegraph Company, of the same place, for "An Electric Clock."

274,445. Adelbert W. Gray, of New York, assignor, by mesne assignments, to the Time Telegraph Company, of the same place, for "An Electric Clock Escapement."

274,613. Alexandre Savoye-Keller, of Locle, Switzerland, for "A Stem-Winding Watch."

274,903. William F. Brennan, of Providence, R.I., assignor of one-fourth to James H. Brennan, of the same place, for "A combined Watch-Key and Cross-Bar for Watch-Chains."

275,494. F. Eugene Jeanjaquet, of Detroit, Mich., for "A Machine for Cutting Watch-Wheels."

275,569. Thomas Benfield, of Brooklyn, N.Y., for "A method of Ornamenting Watch-cases and other articles of Jewellery."

275,762. Thomas Gill, of Waltham, Mass., assignor to himself and Henry A. Hood, of the same place, for "Means for fastening Clicks to Watch-Plates."

276,437. Olaus Olsen Lovaas, of Moss, Norway, for "A Striking Mechanism for Clocks."

276,456. Geo. E. Norton, of New Haven, Conn., for "A Clock-bell."

276,892. Fritz Schuetz, of Carver, Minn., for "A Time-piece."

277,104. George F. Ballou, of Waltham, Mass., for "An Electric Device for Winding Clocks."

277,261. Ralza B. Freeman, of Blossburg, Pa., for "A levelling Device for Clocks."

277,702. Jacob Ganss, of Brooklyn, assignor to himself and John Blackwood, of New York, for "An Alarm Mechanism for Clocks."

277,865. Ezra C. Fitch, of New York, for "A Watch-case."

278,105. Walter D. Davies, of Brooklyn, N.Y., for "A Repeating-Clock."

278,127. Wm. Goy, of Brassus, Switzerland, assignor to A. Goy-Golay, of the same place, for "A Stop-Watch."

278,151. George S. Ladd, of Providence, R.I., for "A Watch-Case."

278,173. Enoch Osgood, of Boston, Mass., for "A Compensating-Balance for Time-Pieces."

278,282. Charles H. Shaw, of Brookyln, N.Y., assignor to Gustave Willemin, of the same place, for "A Guard for the Pendant Bows of Watches."

German Empire.

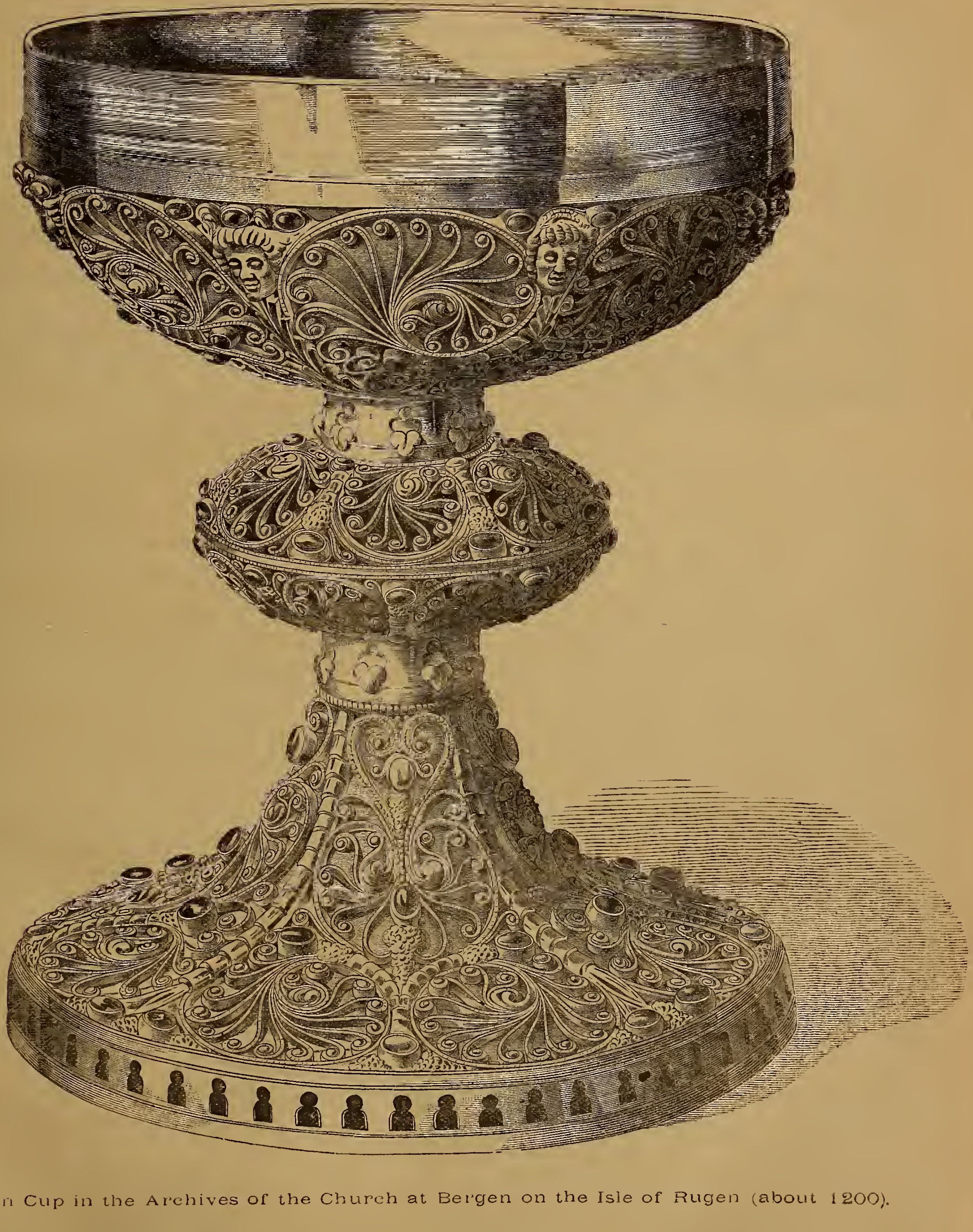
22,320. W. Oelschlager, of Heilbronn-on-the-Neckar, for "An Electric Striking-work for Electric Pendulum-Clocks."

22,325. A. H. Egts, of Burhave, for "An Electrical Clock."

22,334. A. E. Muller, of Passau, for "A Pendulum-Motion for Chronometers."

22,723. Kreuzer Brothers, of Furtwangen, for "A Striking Work for Clocks."

MONTHLY SUPPLEMENT OF DESIGNS.



Roman Cup in the Archives of the Church at Bergen on the Isle of Rugen (about 1200).

(From J. Fischer's "Pattern Book for Jewellers, Gold and Silversmiths, &c.")

THE WATCHMAKER JEWELLER AND SILVERSMITH

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ILLUSTRATED SUPPLEMENTS:—1. Designs for Modern Jewellery. 2. Antique Rings and Ornaments.

Geneva Compensation Trials.

The *Classe D'Industrie et de Commerce* of the Society of Arts at Geneva have, on the proposition of their Horological Section, decided to institute a special competition in compensation (*un concours spécial de regláge aux temperatures*) among Swiss watchmakers, which will commence on the 15th of December next.

Chronometers (or watches) will only be admitted which have been timed in Switzerland.

This trial, organised for the first time in Geneva, is entirely distinct from the annual trial (*concours de la règlage*) and is intended to cause increased attention to be paid to that indispensable foundation of steady performance—perfect compensation—which, as the *Swiss Horological Journal* remarks, has already attained an extraordinary degree of perfection; but it is none the less true that more progress still remains to be made, and some obscure points require elucidating.

The conditions are as follows:—

1.—A special chamber will be constructed, to be placed in the Observatory, in order that a given temperature may be maintained during many consecutive days, which can be varied at will between the limits + 5° and + 35° (Cent.) (41° to 95° Fah.)

2.—In order to eliminate the influence of the accidental variations of rate, each chronometer (or watch) will be observed at the same temperature during five consecutive days.

3.—The temperature will be successively raised five degrees, from + 5° to + 35°, and lowered in the same manner from + 35° to + 5° at the same intervals. Then the temperature is suddenly raised to + 35°. The total series will be thus composed of fourteen periods of five days each.

4.—Between each of the periods of five days, one day will intervene, during which no observation will be registered. Thus, the chamber can be surely brought to the new temperature, and the chronometers can attain a greater steadiness of rate.

5.—Marine chronometers, being only observed in a horizontal position with the dial up, it will be the same with pocket chronometers, which will be invariably kept in the same position.

6.—Each chronometer* will be exposed to the same temperature at two different epochs, and during two periods of five days, of which the mean date will be the same for all the pieces. But the results of the ascending and descending series will be separately calculated, in order to put in evidence the degree of exactness with which each piece resumes the same rate.

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* Our readers will understand that adjusted lever watches are invariably styled Chronometers in Geneva. We reproduce the term as in the original.—Ed.

7.—It results from the precedents given, that the total duration of the trials will be eighty-three days, including fourteen periods of five days, and thirteen intermediate days.

Certificates of rate will be issued from the Observatory, with the necessary comments, and under the same conditions as for marine chronometers.

The result of the trial will be made known at the ordinary session of the *Classe d'Industrie* in April 1884.

Money prizes, accompanied by diplomas, will be presented at the annual session of the Society of Arts in May, 1884.

Our Prize Competition.

Our May number contained the conditions of Competition for a Prize of £50, offered by the Proprietor of this Journal (Mr. A. Fischer), to the writer of the best original Essay on the Going Barrel Watch, and we had been informed that several well-known gentlemen would take part in the same; but we regret to have to state that only one essay has come to hand. This, of course, has very much surprised us, and on enquiry we find that several intending competitors have been obliged to withhold owing to want of sufficient leisure. The time granted was only two months, while in the case of the Burdett-Coutts Prize, offered through the Horological Institute, eight months was allowed, and then a further postponement had to be made.

All we can do is to follow the course usual under such circumstances, and give other would-be competitors a chance by prolonging the time in which to get their essay on paper. The date fixed upon for sending in is December the 10th, which will then enable the judges to make their award before Christmas. We may state, for the sake of those who are afraid to undertake the task for fear of failure, that the unsuccessful essays will be purchased, if the judges think them of any merit.

A novel Compass, invented by Captain Magnagni, has been introduced into the Italian Navy. In it the needle floats on a pool of water, tinctured with spirits of wine to prevent its freezing. The water is contained in a glass vessel with an elastic bottom to allow its expansion and contraction without breaking the vessel. The needle consists of six bundles of fine magnets, built up of best ribbon steel, and fixed on a card. It is enclosed in a hermetically sealed case, which is delicately poised on a brass pivot. The pivot has a sapphire top and a jade point, all highly polished to diminish the friction. The advantage of the compass is that the resistance of the water, being great to rapid movements, is comparatively slight to slower ones; and hence the ordinary movements of the needle are free enough, whereas those due to sudden shocks from without are resisted, with a consequent steadying of the indications. Tried on board the Duillo, it is found that the discharge of a One-hundred ton gun, or the motion of the screw, does not affect the readings of the compass. The effects of the rolling and pitching of the vessel are also guarded against by suspending the floating case a very little above its centre of gravity.

The Maharajah Dhuleep Singh's Jewels.

The plate and jewels of his Highness the Maharajah Dhuleep Singh, of Lahore, has been sold by Messrs. Phillips, Son, and Neale, at their rooms in Bond Street. A handsome silver gilt breakfast service, weighing 182 ounces, was disposed of piecemeal at from 8s. 8d. to 11s. 6d. per ounce; an oval engraved and pierced bread basket, weighing 24¼ ounces, going for £14, and a similar one, weighing 24 ounces, for £12 8s. A series of twenty-four small silver gilt breakfast services, each consisting of tea-pot, sugar basin, cream ewer, toast and egg frame, salt cellar, and spoon, averaging 33½ ounces, each realised from 10s. 3d. to 11s. 6d. per ounce; two glass butter dishes, with silver gilt stands, covers and mounts, weighing 27½ ounces, sold for £17 10s. 9d; and two more, weighing 28¼ ounces, for £13 18s. The other lots were the following: Eight Carlton cruet frames, each fitted with five cruets, and weighing 42 ounces, £27 16s. A chased and engraved gilt ewer, forming a coffee jug, and another to match, forming a milk jug, weighing together 130 ounces, £55. (Dobson). A set of six circular fruit plates, with beaded edges, weighing 122½ ounces, £47 10s.; twelve teaspoons weighing 11 ounces, £6 4s. (Higham); six circular fruit plates with beaded edges, weighing 120 ounces, £45 10s. (Prior); a handsome silver gilt dessert service, comprising two richly chased and embossed two-tier gilt centre-pieces, fitted with three branches for candles, fruit and flowers; four circular and four oval dishes on stems to match, four circular compotiers to match, and twenty-four circular dessert plates, with richly chased borders and beaded edges, weighing 649 ounces, fetched, *en bloc*, £352. A pair of richly chased and embossed claret ewers, with figures and marks in high relief, sold for £48 8s.

Bradford Technical College.—The medals awarded as prizes at the late Bradford exhibition, which have been manufactured by Messrs. Fattorini and Sons, are now on view in the windows of their establishment, Kirkgate, Bradford. Each medal bears on one side a *fac simile* of the seal of the council of the college, and on the other the most perfect model yet made of the buildings, the mould having been altered so as to show the enlarged lantern roof. The work of the engraver has been exceedingly well done, the lines of the building on the one side and the curves and outlines of the figures on the other coming out with marvellous clearness. There are 38 gold medals, stamped 22-carat, old guinea gold being made use of. Each of these medals weighs 35 dwts. (over 1¾ oz. troy). There are 100 silver medals, each weighing 1½ oz., and 82 bronze medals. It is proposed to distribute these at the formal opening of the September session of the college, and the council intend that the presentation shall be appropriately effected. It would be premature to announce who is to be invited to officiate on the occasion, it not yet being decided. The present exhibit of Messrs. Fattorini may be regarded as unique, even among the varied exhibits that have during the past twenty-seven years appeared in the well-known windows at the corner of Cheapside and Kirkgate. It is, beside, one of the last exhibits that will appear there, for in the course of a week or two the business is to be removed across the way, into commodious premises fronting to Kirkgate.

The Worthies of Horology.

By C. Stuart Murray.

XIV.

THE CLOCKMAKERS' COMPANY.

First Part.

We have now arrived at that important period in our horological journey, when the "Most Worshipful Company of Clockmakers of London" comes within our view. And that they are "Most Worshipful," in the civic sense, cannot be doubted. Using the term "Company" as a noun of multitude, we find, upon shaking hands with them, that, like many fellow-guilds, there were trade "innovations" whose value they failed to comprehend, and hostilities whose power was beyond their ken. They did their best, according to the light that was within them—and great was that best at times in both directions—on behalf of their "art and mystery." The *suaviter in modo*—gentle in manner, and the *fortiter in re*—resolute in deed, were equally theirs.

The Clockmakers' Company was the outcome of a quiet agitation, and the resultive petitioning consequent thereon. It was established and incorporated in answer to the supplication of the clockmakers, as well of freemen of the City of London as of foreigners carrying on business and residing within the bounds and liberties of the famous Griffin. A Royal Charter was obtained from King Charles the First, in the year 1631, when their legal name was given to them. It runs thus:—

"The Master, Wardens, and Fellowship of the Art and Mystery of Clockmaking of the City of London." The Company consisted of a Master, three Wardens, and ten or more assistants, chosen out of the Fellowship. The power given by their charter was to make bye-lays for the government of watch and clockmakers who were in trade in London, or within ten miles thereof. But their power did not stop there, for they had the regulation of the manner in which the trade was to be carried on throughout the kingdom! Can we imagine any body of men, in the character of a company, having such far-reaching powers now? But those powers were granted and were exercised for the public benefit; and the language was clear and precise to that effect, so as to prevent the public being injured by persons "making, buying, selling, transporting, and importing any bad, deceitful, or insufficient clocks, watches, larums, sun-dials, boxes, or cases for the said trade." The charter told them, good reader, what do you think, to do? Why, "to enter with a constable or other officer, any ships, vessels, warehouses, shops, or other places where they shall suspect such bad and deceitful works to be made or kept, for the purpose of searching for them." Should the owners of the said ships, shops, &c., offer any resistance, then the charter was "short, sharp, and decisive." If entrance was denied, the officers and servants of the said charter were to do its bidding—and, "to break open any locks, doors, bolts, latches, chests, boxes, &c., where they shall suspect such works to be," and if they were found, they were directed to be seized in the king's name! They were to be "carted" off, firstly, before the Lord Mayor, and should he not desire to sit in judgment upon them, then before the Master, Wardens, and Court of Assistants, where, upon proof of the alleged badness of the work, they were to be forthwith condemned, and sentence passed. There was a right of appeal to the Lord Mayor, but in the event of that right failing, or not being taken, then the condemned were to be broken up without mercy. If that power of the Company was so rigidly exercised now, what a considerable amount of old machinery-brass would be among the marine-store dealers! Power, too, was given to inflict fines and to levy them, upon parties who offended against this phase of "public policy." The power of search was constantly exercised to the end of the century, and with much benefit to the buyers and wearers of watches.

London was divided into districts, and the searchings went on, apparently "without fear, favour, or affection," and many are the instances recorded of "deceitful works" being found, and "executed" by the chief hammerman of the Company. Spirit of the mysteries of locks, bolts, and chests, the presiding genii of the dark, safe-producing caverns of Hobbs and Tann, were you upon the earth in those days; and did the Master and Wardens hold ye at their beck and call?

Were not the trade morals of the craft well looked after in such times? The bye-laws of the Company ordered the prevention of persons of ill-behaviour resorting to London. It was decreed that "no clockmaker, within ten miles of London, shall employ anyone without first presenting him, together with a certificate of his name and birth, for the Company's approval." No clockmaker was allowed to take more than one apprentice without leave of the Court. Every apprentice who had served his time, and was admitted a freeman, was to serve his master, or some other of the fellowship, two years as a journeyman, and then to produce, if required, before the Master, Wardens, and Assistants, his "master-piece," such as he shall be appointed to make, before he be admitted a "Workmaster."

No one was allowed to set up in business in the trade, or even to be a journeyman, unless he had served seven years as an apprentice. Even with all his certificates, and servings, and freedoms, he was not allowed to teach any part of the trade to any other person than his own apprentice. The apprentices, too, were not uncared for. They were not turned into errand-boys for the first year or two in that age, as the following will testify. It was "ordained that every master should teach or instruct his apprentice in the making of cases or boxes of silver or brass, and likewise the several springs belonging to such watches, clocks, or larums, and all other particular things belonging to such watches, clocks, or larums, mathematical instruments, or sun-dials, to the end that he may make up his master-piece with sufficiency of credit, and understand both the beginning and ending of his work, from time to time, which he shall take in hand." It will thus be seen that, as every master watchmaker was to teach his apprentice himself, such master must have learned the trade thoroughly, and have been able to make a watch entirely in every part. To do so, even in these days, would require, as it did then require, a large amount of knowledge of the science, as well as a most skilful, practical acquaintance with the art relating to the whole instrument.

What a vast field of inquiry and information those old watchmakers were bound to travel over, to be sure! Let us consider for a moment the one hundred and forty pieces, or more, that go to make up a lever watch—apart from the chain—and that the metals manipulated are gold, silver, copper, brass, and steel, to which must be added the dial and jewels; the wonder is, and it seems almost incredible, that one man could possibly learn to shape and arrange them all; the more especially when we see from thirty-eight to forty, or even more, persons engaged for the same purpose.

The Court would not sanction the employment of foreigners, unless very good cause was shown for it. The Company must at times have been almost as busy as a Bench of Quarter Sessions, it had so many various functions on hand. They, too, had Quarterly Courts, which every freeman who was clock and watchmaking was bound to attend, under penalty of being fined, whilst all the "goods had to attend along with him as well:" thus it was.

"All clocks, watches, cases, and mathematical instruments, were ordered to be brought to the Court to be inspected, approved, and marked, under penalty for neglect; and any alien working within ten miles of the City of London, and not yielding obedience to the Company, was ordered to have his tools and works seized till he yield such obedience."

There is one thing that may strike the inquirer at first sight as rather singular, and that is, that the Company has no "Hall," nor have they ever had any. The reason, probably, is, that they would necessarily be small in number, on account of the peculiarity of the different trades supervised by them. For instance: a man did not eat his watch, nor wear it out as he did food and clothing. A watch would last a lifetime; whilst a clock passed on from generation to generation as an heir-loom in the family. One "clockmaker," therefore, with his journeymen and apprentices working on from week to week, month to month, and year to year, would be able to supply a goodly number of families with clocks and watches, which instruments, as I have just stated, would become heir-looms, and pass on from generation to generation.

Aye, and about that word "heir-loom." It is often used in conversation, when speaking of the cherished articles belonging to persons, or families; and yet, we may ask any dozen persons among whom we may be sitting, and the chances are, that you will not find one who would not be brought to a standstill if he were asked to give what is looked upon as a proper definition of the term. Indeed, I have seen it upon several occasions myself; and more than once have observed a practising solicitor non-plussed when the question has been suddenly put to him. Nor was he the less willing to join in the general laughter at his own cost—lawyers love the word "costs"—which arose on his momentary failure. As clocks and watches are frequently heir-looms—especially if made by some "Horological Worthy," perhaps it will not be deemed out of place if I venture a little on one side, to give a brief explanation of its meaning.

Like many other terms, that of heir-loom has widened its signification considerably, as will be seen presently. To give any article this name and status, it involves the condition that there must be an heir; and, therefore, we will try to compass that in as few sentences as we conveniently can.

"Heir, by the law of England, is he who succeeds by right of blood to the real property or lands, tenements, and hereditaments of the deceased owner, designated by the correlative term of ancestor, not given away from him by will." Then there are various kinds of heirs, such as heir-at-law, or heir-general, heir-special, by some legal instrument determining that position. Heir-presumptive is he who, if the owner in possession should die without children, would become invested with the property. For instance, the brother or nephew of a man who has no child is heir-presumtive. Heir-apparent is he whose right is indefeasable by legal status; that is, that no man can possibly come between him and the ancestor, as the living owner of the property is called in this kind of law. Thus, the Prince of Wales is Heir-apparent to the Crown, because it is not possible for his next younger brother to become his elder one; therefore, the Prince, as the eldest brother, although not the eldest child, succeeds. The law of England does not allow a female to do so until the male line has been exhausted. We have also the "Heir by Custom," whose right is determined by certain customary modes of descent which are attached to the land. Thus, there are five different kinds of heirs in England, whilst in the Scottish law there are no fewer than ten, beginning with "Heirs-whatsomever," and ending with "Heirs-portioners."

This explanatory statement brings us to our main point, both ancient and modern.

Heir-loom, then, is derived from the English word *heir*, and the Anglo-Saxon word *loma* or *geloma*, household stuff, utensils, furniture, &c. The term comes from olden times; that is, when the clothing and bedding of the family were *woven* at home. The loom, or weaving-machine, was then the most important and the most valuable piece of family furniture. As it was mostly constructed of oaken beams, and firmly fixed to both the floor and walls of the room where it was used, it naturally passed from sire to son. Hence the name extended its meaning to everything that was intended to be neither sold nor given away under any circumstances, on account of its close and long connection with the family life, or expected long connection, such as presentations of clocks, watches, plate, pictures, &c.

Heir-looms in English law did at one time comprehend such articles of household furniture as were not inventoried after the decease of the owner, but necessarily went to the heir along with the house. In *Coke-upon-Littleton* will be found a Latin definition, which is not required here. After the introductory matter concerning the "Custom of the Hundred of Stretford, in Oxfordshire, he mentions a few matters, and says "*Anglice*, an heir-loome." He next names the said heir-looms and, like a sensible man and good lawyer as he was, he goes in for the best of everything in the place; "the best waggon, the best four-wheeled carriage, &c." Originally, the heir-looms included articles of furniture, such as tables, presses, cupboards, &c.; they then comprised deer in an authorised park, fishes in a pond, deeds, charters, and court-rolls, together with the iron-bound oaken chests in which such rolls were kept. There were, too, ornamental chimney-pieces, fixed tables, side-boards, and similar articles of furniture that could not be removed without inflicting damage upon the inheritance. A man may, by will, specify any chattels that he intends to be heir-looms. Of course, this definition is on the assumption that the estate will be sufficient to pay all the deceased's debts.

In some places, according to custom, carriages and household implements may be heir-looms.

We need not be surprised that such "store" was set upon the loom in the family, until it gave its name to the most prized articles of the household that were, and were to be, "heir-looms." We find the work of the loom mentioned in many places in the Bible. In Wilkinson's "Manners and Customs of the Ancient Egyptians," throughout India and the whole of the East, the loom was the foremost treasure; it was even found painted and engraved upon the tombs at Thebes. The ancient Greeks and Romans excelled with it, and the Hindu shawl-weaver does so in the present day.

I said before I entered upon this explanatory digression, that the Clockmakers had no "Hall," and gave what I considered to have been the reason for it. But they were not without comfortable quarters for all that. We must remember that the taverns in those days were quite different places to what the present day requires. Merchants, and Masters, and Wardens, then lived on the premises where their incomes were made, or within a comfortable walking distance, whilst shop-keepers invariably dwelt over their shutters. They did not "reside" at a radius of from three, or five to fifteen miles from where their bread was earned, for the very sufficient reason that there were no "lines," neither underground nor overground, to carry them to and fro. Nor could they send a "wire" down, nor a "wire" up, telephone, or otherwise, in a few seconds. No; they *lived* within, at farthest, an easy distance, and the taverns partook of the characteristics of that mode of existence. The tavern was the private snuggery, the genial club, or the "Hall" of any Company, or body requiring ample accommodation. Hence the Clockmakers met at whatever tavern suited them. There, in the room that was their hall, they sat under their own banner of the clock shield, supported by the figures of Time on one side, and Sovereignty on the other. They discussed their laws, issued their decrees, with *Tempus Rerum Imperator*, their motto, and disposed of offenders, and enjoyed their "banquets"—*dinners* they called them, and quaffed each others' healths after their own way.

But their "book-keeping," their "journals," and "minutes," showed that pleasure was subordinate to business. Those journals have been kept in the most exact order from the first incorporation of the Company until the present hour. And they are, too, in an excellent state of preservation. In some of the earlier entries we read of blacksmiths being "mixed up" in a kind of rivalry with the clockmaker pure and simple; it seemed to be not unlike the difference in fellowship between the barber-surgeons and their rivals of of an older age. One may ask, "What had blacksmiths to do with clockmaking?" But they had a good deal to do with it at one time. Although they were not strictly "Clockmakers," yet they were in another way makers of clocks. We have only to consider that the early clocks, both large and small, were almost entirely constructed of iron, and that the blacksmith was an established, skilled artisan, long before his brother the clockmaker came into existence. Therefore, in making the wheels of the larger clocks, the hammer and forge of the disciple of Vulcan was called into active working; the blacksmith could not be done without. The inventor is good, but, if he cannot put the scheming of his brain into practice himself, he must go to somebody who can.

As I cannot say all that ought to be said on this very interesting subject now, I must defer the concluding part until the ensuing number. I will then give some curious outlines from the journals of the Company, with a complete list of its members at the time of its incorporation in the reign of the first Charles.

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Historical Notes of Voltaire, as Watchmaker.

(*Continued from page* 12).

These events had their due effect on the French representative at Foreign Courts, whose patronage Voltaire solicited by a circular on the 5th of June, either in the form of direct orders for watches from Ferney, or recommendation to substantial merchants. This led to very satisfactory results; indeed, no better course could have been adopted to gain access to the leading markets. Only the Ambassador at Rome, Cardinal de Bernis, neglected to notice the appeal from Voltaire. In consequence of this, the philosopher wrote on the 26th of November, in his usual spirited manner, to the Minister Richelieu: "I have never yet felt myself excommunicated so much as in this matter." (It is well known that Voltaire was excommunicated by the Papal Church, on account of his freethought principles). This expression of Voltaire might warrant the conclusion that he received the treatment from the Church Dignitary in good humour. Such was, however, not the case; on the contrary, he felt greatly annoyed, and being unable to bear it in silence, he wrote a letter of reproach to the Cardinal.

Ferney, 28th December, 1770.

Monseigneur:—I learn from your letter to the Academy of Marseilles, that you are my patron, but the mode in which you treat my Colony convinces me that your disposition is in no way favourable to me. I must confess that this concerns me much. I have not merited such hard treatment, and therefore complain of the great pain this causes me. . . . . . . There is not another Ambassador who has not exerted himself to establish a connection for us in their respective cities. You are the only one who not only show us no such kindness, but did not even think it worth his notice to reply to me. . . . . . .

On January the 3rd, 1771, he observed to Lady Argental:

I commended my manufactory to Cardinal de Bernis, but he has taken no notice of it. I feel very displeased with him, but he only mocks my resentment.

A direct contrast to the above was found in the Marquis d'Ossim, the Spanish Ambassador, who served under a Ministry which had expelled the Jesuits. He showed unlimited kindness and devotion to Voltaire, for scarcely had he received his circular before he enquired for the prices, to which the Philosopher replied as follows:—

Ferney, July 16th, 1770.

Sir,—I have the honour to submit to your Excellency the price list of the factory of Messrs. Dufour and Ceret, of Ferney.

I shall be pleased to receive the favour of your orders.

A repeating watch is now nearly finished, with a likeness of the Count of Aranda, and another with one of the Duke of Choiseul.

Should your Excellency desire anything in this way, we shall be at your service; certainly you, or your friends, will be able to purchase considerably cheaper at our factory than anywhere else.

The Duke of Choiseul, who has bought the first six watches made in Ferney, will second the statement I have the honour to make to you.

The emigrants who established this factory are persons whose honesty I will warrant. I venture again to solicit the exercise of your influence for them in Spain, as the factory anticipates the best orders from that country.

I have the honour to be,
Your Excellency's humble, obedient and thankful Servant,
Voltaire.

The above letter was accompanied by the following Prospectus:—

Dufour, Ceret & Co. commend themselves, as the originators of the factory at Ferney, for all kinds of Watches, the cases of which can be ornamented with portraits in enamel according to desire; but especially are they in a position to supply their customers with Watches cheaper than any other manufacturer, since they have been favoured with protection and exemption from Taxation by the King.

	Louis d'or.*
Watches, in plain Silver Cases	3
,, in Engraved Cases	4
,, in Cases of mixed pattern	4
,, with Repeating Movements	14
,, with plain light Gold Cases	7
,, with 18-carat Gold Cases	8½
,, in One ounce Gold Case	9
,, in Good, Engraved and Chased, Gold Cases	10
,, in fine Coloured Gold Cases	13
,, with Repeating Movement in Plain Gold Case	20
,, In Chased Case	21
,, with Repeating Movement in Coloured Case	24 to 28
,, Horizontal Escapement	32 to 38
,, Ditto with Seconds	42

We warrant all Watches above 8½ Louis d' or for two years.

DUFOUR & CERET.

(*To be Continued.*)

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Mr. E. J. Watherston sends the following:—

SILVER—

Year ended March 31st	Weight upon which Duty was paid.	Weight upon which Drawback was allowed.
	oz.	oz.
1882	758,634	109,998
1883	749,504	104,737

Not in such "high estimation" at home, or abroad!!!

1855	994,360	156,440 !!
1865	858,173	133,160 !!
1875	886,493	120,280

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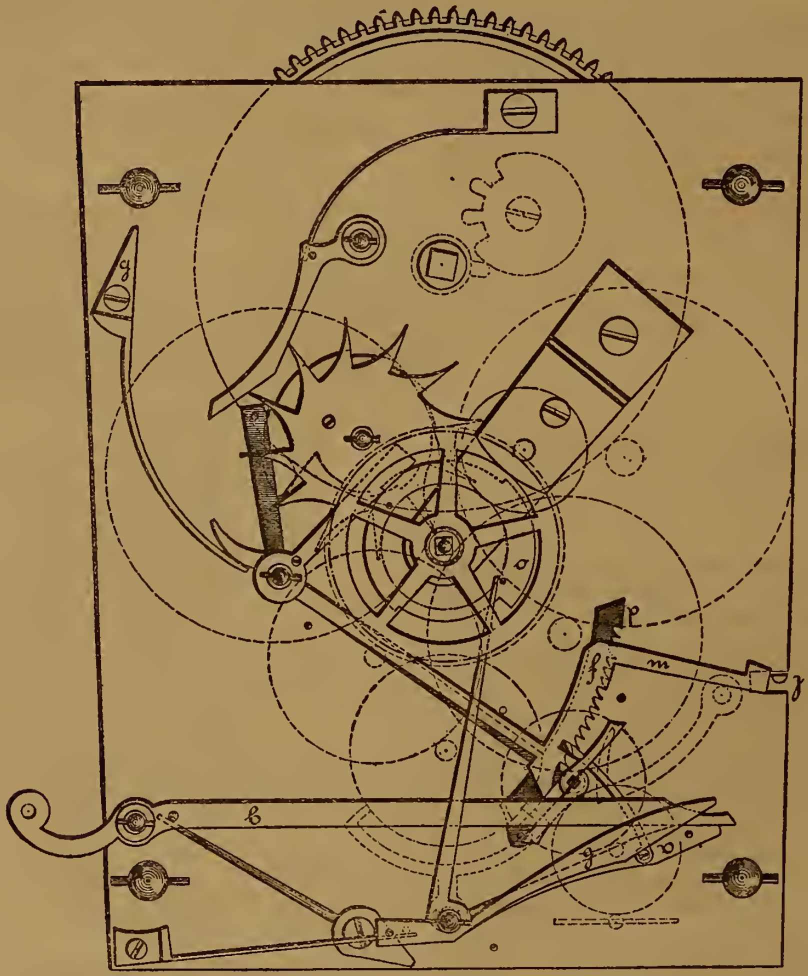
* 23 francs 55 cents, or 18s. 7¾d.—Ed.

New Hour and Quarter Repeating Motion for Clocks, with a Single Striking Train.

PATENTED BY KLUMAK BROS., VIENNA.

(*Concluded from page* 153, Vol. VIII.)

THE construction shown on page 152, Vol. VIII., has the peculiarity that the hours are struck before the quarters, as in the case of repeating watches. This method of indicating time is contrary to traditional custom, and though technically there is nothing objectionable about this; yet it is to be feared that the conservative spirit of the public would reconcile itself very slowly with this condition.



By reason of this, Mr. Klumak was induced to design a new arrangement which is in harmony with the habit of the public, of having the quarters told before the hours, as is the case in other clocks. This latter system is shown in the accompanying illustration.

It will be noticed, on comparison, that it is more simple than the former, as the retainer *c* and spring *e*, which in the former are screwed on to the quarter rake, are here dispensed with.

The teeth of both rakes are here in the same vertical plane, and the hour rake retainer carries an auxiliary tongue, which acts into the quarter rake, and is a substitute for the quarter retainer. The last tooth of the quarter rake is cut deeper than the rest, and so adjusted as to allow the auxiliary tongue to drop into it at the last stroke of the quarters.

In this, as in the first arrangement, both rakes are relieved at the same time, by reason of displacement of the retainer, through a blow from the reliever *b*, when both rakes fall back on their respective cambs.

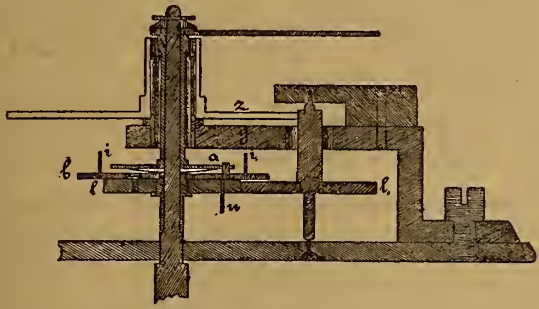
When the quarters are struck, the auxiliary tongue acts in the teeth of the quarter rake, which prevents the one corresponding to the hour rake from contact with the teeth of that piece, which, therefore, falls back on to its camb at every stroke; but when the longer tongue drops into the deeper cut tooth of the quarter rake, the shorter tongue is brought into contact with the teeth of the hour rake, and the hours are struck in the usual manner.

Otherwise, all the principal parts and conditions are virtually the same as in the first arrangement, with exception of an unimportant alteration in the direction of the motion of the rakes, which is reversed, so that they fly upwards instead of downwards as in the former, when relieved.

The arrangement of the going motion of the Klumak clock possesses also something special, as shown in the last figure of the present illustration.

In this figure, *l* is the minute wheel, *e* the cannon, *z* the hour wheel, and *b* the quarter camb; *n* the pin for shifting the hour camb, and *i i* two of the four quarter relieving pins.

The cannon tube is composed of two parts, the lower end of which carries the wheel and camb, and the upper a disc against which the clamping spring presses, as shown in the sketch. The connection between the two sections is effected by the pin *a* inserted into the quarter camb, which acts into a corresponding hole in the disc. This arrangement is more in conformity with the rest of the motion, and saves the necessity of a large pipe, which presents some difficulty to production in a perfcct manner.



The plan shown of the striking motion is that of a spring clock with a short pendulum, in which the going and striking trains are driven by one spring, after the method of French alarm clocks.

Thus far the arrangement has worked very well; certainly the cases in point have been movements of very careful construction. No doubt, when manufactured *en masse*, they will bear the sins incidental to such processes.—*Oesterreichisch-ungarische Uhrmacher-Zeitung.*

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Chronometers v. Levers.*

D. C. L. writes us as follows:—

> "I am hoping soon to see something of your own on the subject of pocket chronometers. I have a profound admiration for the principle of the spring detent escapement, and should very much like to see it constructed as to come into general use for all fine watches. After having really studied the literature of this subject, I am sorry to find that its tendency now is adverse to the detent. Saunier and Rigg, for instance, are both opposed to it. I also fancy that provincial watchmakers generally try to dissuade their customers from trying pocket chronometers."

Our correspondent writes to a similar effect in the *Horological Journal*, in the columns of which an exhaustive (and exhausting) discussion took place, from October, 1881, to the following August, arising out of the publication of a drawing and description of an improved lever escapement made by Mr. Schoof, of the merits of which he is so convinced that he has submitted a marine timepiece containing one to the annual competitive trial at the Royal Observatory.

It is not our desire to write a sentence now that would tend to revive that discussion, especially as the results of the trial will so soon be made known, concerning which all speculations are futile; as it is well known that the most carefully prepared instruments often greatly disappoint the expectations of their makers, and the success or failure of the one in question could not be expected to decide the point. We thought it would be interesting to our readers to reproduce some of the opinions of the authorities already referred to, which appear to us to be as favourable to the detent escapement as any chronometer maker could wish, the use of pocket chronometers being necessarily limited.

M. Saunier says, in his "Treatise on Modern Horòlogy," par. 877:—

> "The detent escapement does not admit of any second-rate workmanship. All the causes of stoppage and variation result from bad manipulation, or errors in principle.
>
> "It is useless to enumerate these causes, which we have indeed already indicated. Any watchmaker of ordinary intelligence should be able to detect them; otherwise he must proceed to study the escapement from first principles, before he undertakes either to make or repair it.
>
> "With regard to the faults that are inherent in this particular mechanism, such as *setting*, *tripping*, and *banking*, they have been reduced to a minimum, and need not be feared in a well-made timekeeper, except when it receives a jerk during winding, or if it is subjected to violent shaking, as in walking, riding, &c.; but we must again repeat that the chronometer escapement is not suitable for daily use; it should only be employed in instruments intended for scientific observations, and by those that know how to take care of it."

Mr. Rigg says in his "Cantor Lectures on Watchmaking," 1881:—

> "It remains for us to briefly consider the chronometer or detent escapement, as it is occasionally employed in pocket watches. Although it is, without question, by far the best for the marine chronometer, many competent horologists maintain that a mistake is made when this escapement is used for watches, as its action is liable to be disturbed by shocks; so that while more expensive than the lever, it is, for a watch, not superior to it as a timekeeper."

Mr. F. J. Britten, in his new Handbook, which he says in the preface is a reflex of the experience of the most eminent men engaged in the trade, refers to the chronometer escapement as being unexcelled for timekeeping; and, as a matter of logical sequence, to the lever, as being inferior to it.

The action of the detent escapement makes it especially suitable for instruments intended for scientific observation. The balance receives an impulse at every other vibration; therefore, with a 14,400 train, as in marine chronometers, a half-seconds beat is obtained. A pocket chronometer, with 18,000 train, beats five to two seconds, as also does the duplex; but the continuous motion of the seconds hand to an ordinary lever watch gives no rest to the eye, and is therefore objectionable.

To obtain half-seconds beat with a lever escapement, no matter what the construction may be, the train must be 7,200, which is totally unsuited to any instrument which has to be carried about. Fifty years ago, the 14,400, or quarter-seconds train, was commonly used, but it has gradually disappeared before the march of improvement in pocket timekeepers, and the 18,000 train (which some consider rather *too* quick for timing purposes) is extensively used for high-class watches, under the idea that the liability of the balance to "set" is reduced, and more power is also transmitted to the escape pinion.

There is no doubt, however, but that some chronometer makers, in their anxiety to produce an absolutely perfect timekeeper, have made the construction of the escapement too delicate, and the balance pivots too fine, so that as an energetic City retailer once remarked, the watches were only fit to be kept under a glass case. This is a failing inherent in all highly-trained workmen, and many apparent defects in the action of the chronometer escapement may be traced to this cause.

D. C. L., in the *Horological Journal*, hopes that another Harrison or Earnshaw will arise; but it must be remembered that their efforts were stimulated by the prospects of obtaining substantial rewards, which are not likely to be repeated at the present time.

At one time, the possessors of "chronometers were regarded with reverence by their particular circle of acquaintances; but the distribution of hourly time signals through the length and breadth of the land has placed the wearers of watches very much on a level, the demand has fallen off through causes quite apart from the principle, to the consequent disorganisation of the workmen; and in an age like the present, when trade literature has so much influence, we think that the highest branch of the Horological art, which stands quite apart from gencral commercial questions, should receive all possible assistance and encouragement.

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* Held over from last month.

How to Finish a Full-Plate Fusee Watch.

To many of our readers the contents of this paper may seem unnecessary, and opposed to the spirit of the present day, as well as to some of our more recent utterances; but fusee movements are not yet extinct, while at the same time the old-fashioned frame finisher is nearly so. There will always be a straggling, uncertain trade in these watches, and we hope that some of the instructions now given, founded on personal experience, will be useful, especially to students. Should any parts seem obscure, we shall be happy to give further explanations.

The first thing that a finisher should do is to see that the plates are square, and that the upper plate fits properly on the pillars—this ought to have been previously attended to by the escapement maker; but it not unfrequently happens that the escapement is made before the frame has been cased and motioned, and the pillar-plate almost invariably goes out of square after being cut out for the bolt and joint. This having been corrected, the back centre wheel pivot is made, care being taken to leave it as large as possible, with a view to future repairings, and the back centre wheel hole is put in; a true, turned stopping should be well driven through from the inside.

The sink is then turned over in the mandrill, and left rather rounding; previously to doing this it should have been ascertained that the minute wheel pin is sound, and correctly placed.

Then see to the fusee and centre depth, and after drawing the fusee bar hole, if necessary, put a stopping in as before, and make the lower pivot; this should be backed a little so as to allow of the stopping being left up in the bar, for the sake of getting a longer hole.

It is now usual to prepare the wheels for the gilders; the arms and rims are cleaned up, and hollows turned round the rivets with polished gravers of a special shape. They frequently require thinning a good deal, and after turning over the rivets it is necessary to rivet them again, otherwise they would come loose; care should be taken to remove all burrs from the teeth and arms. Clean and equal teeth are absolutely necessary in pitching a correct depth.

While they are being gilt, the fusee can be proceeded with. Polish the edges of the cap; some do this on a piece of cork in the vice, and others in the turns. In this latter plan, the turns are fixed in the vice at right angles, centres vertical, and the great wheel is pinned on the fusee for the convenience of turning it round. A collett should be placed over the upper pivot to keep the polisher off it. This pivot is frequently left too long by the movement maker, and the squares should be backed to the proper length before finishing the pivot. In uprighting the fusee, the upper hole should be so managed that it leans towards the detent. Before putting in the stopping, stone upper side of plate, then mark the inside of hole with a sharp brooch. In turning round the outside of stopping after rivetting, it is important not to get it smaller than the hole, otherwise the rivet would be turned off; the sink on the other side to be highest in centre, to free the poke of cap.

The detent work now follows: the blade of detent must be perfectly straight—or parallel with plates; if it will not bend, the centres must be thrown out to produce the required result. Care must be taken to turn the fusee brass smaller than the steel wheel, also to leave the blade of detent perfectly free of great wheel; the detent spring must be quite free of blade.

Now comes the stop work, which very few finishers pay sufficient attention to, although it is, perhaps, the most important part in the watch, and cannot get wrong when once right. The end of stop should form a right angle with the stop stud and fusee hole, and to ascertain the correct position of hollow the name-bar should be screwed on and the barrel and fusee placed on upper plate; then put a hair under the fusee cap and over the outside of barrel crossing the stop; this denotes the proper place for the hollow. Unless the chain acts fairly in the centre the stop acts too soon, and it will also do this if it does not lie close down to the groove in plate, which must be the same level as the sink.

The end of the stop must not be too thin, otherwise there is a danger of overwinding through the poke passing over it. If a watch is being finished, regardless of time and trouble, the stop-work ought to be tried before it is gilt; but the necessity of making a "Saturday night" has caused this to fall into disuse. A notch requires making under the stop to receive the end of stop spring, which is bent so as to be quite clear of the front of stop stud. Next follows the cutting of the fusee, which calls for great judgment on the part of the cutter, as, if room is lost, a watch with pillars of 0 may practically be made no higher than one of $\frac{0}{2}$, with this additional disadvantage, that the mainspring is much too strong. In order to obtain the proper number of turns, the fusee cutter is furnished with the number of teeth in great wheel and centre pinion, which are generally 72 and 10. For the watch to go 30 hours, 4¼ turns are required. Putting the pin in for the chain, although too often done in a hurry, is really a very delicate operation, and is the key-point of the watch.

The barrel arbor is next attended to. The diameter of the body should be equal to one-third of that of the inside of barrel; sometimes the pivots are oval and require carefully catching true, otherwise it is impossible to get the barrel properly flat. After the pivots and body are finished the hook is put in; the movement maker usually drills the hole, but its position is not always to be depended upon, and the hook ought to act in the centre of the mainspring, otherwise the eye is likely to foul either the barrel or cover. The barrel hook is now put in. Formerly, square hooks rivetted on the spring were invariably and punctiliously put to English watches to distinguish them from foreign, which had the other kind; and as long as the original spring remained in the barrel there were no objections to their use, although it has been argued that they rather shorten the action of the mainspring, by keeping a certain part firmly fixed against the side of the barrel. Like everything else in English watches, they require to be *well* made and fitted, otherwise they will draw out and do more harm than good.

In putting in the other kind, or "French" hooks, the hole is drilled in the direction of the outside of the lobb of the barrel, and tapped with about a 13 tap; the hook can be either brass or steel if the barrel is polished, but only the former if gilt. It must be screwed through the barrel just the right length, and in rivetting, the point is slightly bent towards the edge to form a hook for the spring to hold by.

The hole for chain is, as a rule, so placed that the chain all but touches the plate, which has to be turned to free it. Care must be taken so that it will not throw the hook over in either direction.

In running the barrel, it should be left leaning a little from the fusee. See that it is thoroughly free of the under side of name-bar and foot of cock, also of the circle in upper plate; this is also the time to free name-bar of balance, and to ascertain if potence is free of chain. Nine-tenths of the troubles with fusee watches have arisen from fundamental points, such as now indicated, having been imperfectly attended to. It is usual in a right-handed movement to put a stout pin close to the nose of the potence, to protect the escapement from the effects of the chain breaking, on the same principle as the circular guard to an eight-day chronometer.

Finally, it is essential that the holes in bottom and cover fit the pivots properly; they can be generally knocked up and round-brooched if the pivots have been reduced a little, but failing this, stoppings must be put in, or even a new cover made. A barrel with wide holes is not to be tolerated in a good watch.

To be Continued.

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The Protective Measure of the Vienna Watchmakers.

[Communicated.]

We read that certain people in an Eastern city of old made it their constant business "to hear or tell some new thing;" but the modern dwellers in the "Kaiser-Stadt" appear to spend their time—or a large portion of it—in seeking confirmation of what they have heard, at the expense of their neighbours; for, according to the *Austrian-Hungarian Horological Journal*, the watchmakers of Vienna are pestered with people who call on twenty to thirty shopkeepers at a time, simply to ask the value of their watches. Indeed, this class of "mendicants" must have grown to a very large proportion, as is evident by the fact that the Vienna watchmakers have been obliged to have recourse to some mutual protective measure against their vexatious incursions.

By an earlier resolution of the Vienna Watchmakers' Association, the valuation of watches was prohibited to their members. It was soon found, however, that this would not work; hence this resolution was superseded by a new one, which prescribes a uniform charge of about 6d. for silver watches, and 8d. for gold ones.

The principle or object on which this society based its first decision was cf a negative character. In valuing a watch, a watchmaker is threatened by the two horns of a dilemma: namely, either to price it too low, and so do injury to a honest tradesman, or too high, and so endorse some cheating transaction. To escape this danger, it was resolved not to value at all; this step, however, landed their respective members between the horns of a new dilemma, viz., either to offend, perhaps, a good customer, or to break the law of the society. To relieve them of this difficulty, a compromissorial measure was passed, and carried into effect by supplying each member with a printed copy, to be exhibited in their respective establishments, and to which they can point when their opinion as to value is solicited.

There can be no doubt that this measure will diminish the number of this class of customers; but it will, by itself, not remove or neutralise the cause from which this display of suspicion springs.

The public all over the world have learnt to know that watchmakers in 999 out of 1000 cases are not men who make watches, or even can; hence they are under the impression that they can get a watch without going to the watchmaker, and that by so doing they can get what they want for less money.

Unscrupulous traders and advertisers have taken advantage of this, and imposed on the public by selling perfect rubbish, under the plea of taking less profit; and thus, with a set of manufacturers and wholesale houses who supply anybody, all the world deals in watches and clocks; hence the bargain-hunting public is in perpetual terror of being taken in.

Watch repairing and watch selling has become quite deforced; and, unfortunately, the former suffers under a difficulty for which the latter is responsible.

While the sale of watches was in the hands of watchmakers, they made the repairing quite a secondary matter, and made the buyer pay for the expense of repairing other people's watches. Thus they brought the scale of charges for repairs to a standard which pressed heavily on the workman, and is out of proportion, altogether, to the knowledge and skill that is required.

This has been brought about by the mere watch-seller; but his time is past, the public are learning to do without him, and with the stores on one side and other large chandler shops on the other, he is pushed hard, and only those who are masters of the trade they represent can hold their ground.

Watchmakers labour under like difficulty in England or the Continent. It is the result of dishonest transactions, and can only be remedied by fidelity to honesty and thoroughness.

The watchmakers of Germany have recognised it, and endeavour to impress this principle as a matter of the "best policy" on all members of their numerous societies.

It is after all natural, when we are in want of something, either in trade or profession, to endeavour to find a man who is master of it. Hence, when the public know how to find him from among the pretenders, they will go to him, and when he deals honestly and perseveres in doing so, they will trust him, be he in London or Vienna, and not call on a score or more of others before their suspicion is allayed.

In England the faith of many in the stores is almost as good, if not better, than their faith in God; but it is a long way from it that the transactions of the stores warrant it, hence, sooner or later there will be a reaction. If the watchmaker of the day is only true to himself, to honesty and truth, things will and must amend; for he has opportunities lying at his very door, which, if he will but use, will bring him a better future.

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Watch Trials at Neufchatel.

Doctor Hirsch,* the Director of the Neufchatel Observatory, in his report of the results of the trials of 1882, says, that while there has been an increase in the quantity, there has been a slight falling off in the quality of the watches submitted, and comments on this as follows:—

It decidedly appears that when the demand increased, our manufacturers and timers, too much pressed, did not give themselves the necessary time to give the last careful touches to the regulation of the chronometers. But there is, perhaps, another cause to which one can attribute this small falling off in the results denoted by the observations. It is that by the side of the old houses and the adjusters, whose names have appeared for a number of years on the lists accompanying the reports, we find a tolerable number of new makers and timers who have applied themselves to the manufacture of adjusted watches (*horologerie de précision*) and who have sent chronometers to the Observatory.

Evidently, we should congratulate ourselves on this recruiting from new elements, which is a proof of the vitality of our horological industry; but at the same time, it is natural that these recruits do not possess at first the same ability and experience which distinguishes the veterans of the chronometrical art. However, we ought to hope, that with perseverance, and by profiting from the lessons that they can draw from the rigorous registration of the results obtained, the new generation will equal, and perhaps one day, surpass, the old:—

306 watches were tested, as against 270 in 1881. Of these

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* Doctor Hirsch shews, by the mean results of twenty-one years observations, that watches with lever escapements have proved better timekeepers than those with chronometer escapements, whether spring or pivotted detents; but such a result with stationary watches is opposed to the theory of the respective merits of the different escapements. We think it is to be partly accounted for by the supposition that all the watches had going-barrels; the varying strength of the mainspring is not a fair test for a chronometer escapement.

234 obtained certificates, or 77 % of the total amount, the proportion the previous year being 84 %.

Three marine chronometers were entered, but no certificates were given; they were withdrawn by the maker, who was not satisfied with the result obtained, although it was within the limits of the regulations.

Of the 234 watches which obtained certificates, 191 had lever escapements, 39 pivotted detents (*à bascule*), 2 spring detents (*ressort*), and 2 *tourbillon*, of which the mean daily variation is as follows: $0^{s}52$—$0^{s}66$—$0^{s}775$—$0^{s}425$.

Dr. Hirsch comments on these respective variations as follows:—"It is only the two first escapements, lever and pivotted detent, of which the mean variations have a special signification, because they result from a sufficient number of pieces observed; so that the extraordinarily large variation of the spring detent escapement has no importance, because only two chronometers are provided with it; and if the tourbillon escapement, again, shews the smallest variation, it must not be forgotten that this difficult construction is equally only met with in two pieces.

"That which strikes us is the marked variation of the chronometers provided with the *bascule* escapement. This time it is not only sensibly larger than those of the lever watches, but it has attained a figure which we do not find in the statistical table issued in 1867.

"To what must this sudden inferiority be attributed? It cannot be explained by chance, because the mean is drawn from the sufficiently large number of 39 chronometers. Is it that some special workmen have disappeared and been replaced by others, at present less skilful? In any case, this escapement is a speciality of the Swiss chronometer; it is to be hoped that it will retake its perfection."

The remainder of the report now before us, which is to be continued in the *Journal Suisse d'Horlogerie,* is occupied by a minute comparison of the results obtained from the various forms of pendulum springs. We note that palladium is employed in nine instances, and that the result is spoken of as "being still less satisfactory than that of the year before, and the variation notably larger than the general mean."

212, or 91 % of the successful watches, have various forms of Phillips's springs. We bring this paper to a close by reproducing their performance. The marine chronometers, previously referred to, were classed as A.

Class B.—30 watches observed during six weeks, in five positions, having given a *mean daily variation* of $0^{s}48$ ($0^{s}46$ in 1881).

C.—114 watches observed during a month, in two positions, having given a *mean daily variation* of $0^{s}54$ ($0^{s}52$ in 1881).

D.—90 watches observed during fifteen days, lying, and in medium temperature, having given a *mean daily variation* of $0^{s}57$ ($0^{s}57$ in 1881), the average of the whole being $0^{s}55$, as against $0^{s}53$ in 1881; so that the slight falling off referred to in the commencement of the report is not very appreciable, and only shews what a precise and severe standard our Continental friends submit to be judged by. These ideas have spread, and are spreading, among wearers, and English watchmakers must not lull themselves into a condition of mistaken security of their supremacy.

Queries and Replies.

I have a number of Jewelling Cutters with my Mandril (Geneva make). Will someone kindly inform me how they are to be shaped up for use?—Seconds.

Indian Art Work.

TAKING metal first, it should not be difficult to show that there is still good design in the land. Unfortunately, objects handy for exportation and suited to Western uses are the first to show the deterioration complained of. A native metal chaser, when at work on articles for home use, proceeds in a perfectly simple and rational way, fitting the scrolls, leaves, or grotesque creatures of his decorative répertoire with consummate propriety and tranquil certainty of hand to hooka bowls, water vessels, rose-water sprinklers, and the like—objects of definite and accustomed uses, and of forms that only vary in subtlety of line, and are never tortured by wilful efforts to attain mere novelty. For these, however, Western folk have but little use. They demand from him tea-pots, cream-jugs, race cups, and "vases"—a terrible word, meaning a hundred shapes, from the Italian alabaster horror three feet high to the opal and ruby Bohemian-glass chimney ornament. So he is shown English silversmiths' and electroplaters' illustrated catalogues. These come with the sanction of finer print and paper than the Indian workman has ever seen; and being English, have an authority which only those who have tried to explain their real worthlessness to the native can understand. These, it is plain, are disturbing influences; and the problem of fulfilling Western uses, without losing the Oriental spirit, can only be satisfactorily solved by the improved cultivation and taste of Western buyers.

Since natives almost invariably use brass or copper for culinary, domestic, and sacrificial purposes, the coppersmith's trade, with the attendant crafts of casting, beaten or *repoussé* work, and chasing, is universally practised. It may be noted that very little engraving, in the Western sense of the word, is done in India as a means of decoration, and the fine meagre lines on perfectly true, hard surfaces, the pride of European workmen, are comparatively unknown, since the graver, or burin, held underhand, cutting a clean line from which the burr is scraped, is not used. The hammer, punch, and chisel produce a bolder, simpler, and more effective decoration. The most popularly known variety of this work as a commercial product is the Benares ware, largely produced for a not very intelligent market. The entire surface is covered with grotesque figures and foliage, boldly chased and highly polished. The forms are very various, but the prodigality of thoughtless labour, which leaves no morsel of skilfully contrasted plain field, ends by being tiresome. In this case, as in other branches of industry, the Hindu middlemen and dealers, who, like all the clerkly races of Hindus, such as Bengali baboos, khutriyas, &c., are curiously indifferent to art, care only that there shall be "plenty work" on the wares they sell. The truth is that better brass-work than that of Benares can be had in several large towns, especially at Ahmedabad, in Guzerat; while scattered over the country are artificers who make lamps, antimony bottles, images, caskets, sacrificial spoons, &c., in purely Hindu taste, using elephants, birds, animals, and grotesque divinities in the fashioning of these pleasantly quaint and interesting objects.

The *siyah kalambari*, a sort of niello made at Moradabad (northwest provinces), where deep graving in brass is filled with a hard black composition, and then tinned or silvered, with sometimes the brass reserved in places, and polished to a perfectly smooth surface, is one of the most familiar and highly finished forms of Indian metal-work. It is really a revival, and owes much to the fostering care of a member of the government, and of a native gentleman of position. The patterns show the usual modern tendency to excessive minuteness, and mechanical finish is perhaps more considered than variety of design. But the art is capable of extended application, and its means are so simple that it will be difficult to vulgarise it. Obviously it must be very bad ornament indeed to offend the eye when delicately traced in silver and gold on a ground of pure black.

An older method of decorative metal work—silver inlaid in a black material resembling pewter, but much harder—is known as Bidree ware, from the old Mohammedan town of Beder, where it is believed to have originated. The pattern and not the ground is here graven and channelled, and tiny plates and wires of silver, cut to shape with scissors, are hammered into the forms, the final polishing resulting in a silver mosaic on a fine-toned *mat* black, which, however, is scarcely black. Formerly the designs were bold as well as delicate, and portions of the dark field were left, while now an equal distribution is aimed at. Both notions are sound enough, but the exclusive practice of the latter gives the work an air of monotony. Hyderabad, in the Deccan, is the modern seat of this manufacture, but it is also practised at Lucknow.

In Southern India, at Tanjore and Madura, copper vessels, trays, &c., incrusted with silver cut in the forms of fishes, animals, flowers, and ornaments of distinctly Turanian character, are produced. The silver is worked in thicker pieces than seems necessary to the effect, and when new the contrast between the red copper and the white silver is more pronounced than pleasing.

The metal chasing of Cashmere is of Persian origin, and copper is the favourite material. Arabesque ornaments that sometimes recall the fine patterns on old Persian wine bowls, but more frequently a uniform distribution of minute details resembling the shawl patterns, are engraven, and then filled with lac, the raised parts being tinned like Moradabad niello, only in the Cashmere work the surface is not made so mechanically perfect. Besides this pleasant roughness, which gives a better tone to the Cashmere ware, the design is in a quite different style and feeling. Silver is treated in a similar way, without a black ground, but sometimes with the addition of coloured enamel, usually disagreeably raw and crude in colour, and more often with a light gilding on the raised parts, which produces a singularly delicate and pleasing effect, the rest of the chased work being left in a peculiar tone of dead and half-burnished white, like snow and pearls just touched with gold. In nearly all modern Cashmere products the well-known pine form of the shawls may be considered the decorative unit, re-appearing in painted papier-maché, wood-work, and metal. This misruled country is liable to famines, and in former times large numbers of workmen emigrated to the plains. "Cashmere" silver-work is now made at Lucknow, and at Amritza is an important trade in Cashmere shawls.

The silver-work which takes its name from the kingdom of Cutch, and the best of which is made at Bhuj, the capital of a native state north of the Bombay Presidency, is nowadays applied to articles of European use, and finds extensive sale. The workmen are Hindus, and among their ornaments figures of animals and occasionally of divinities are seen. Generally the patterns are of equally distributed scrolls and foliage in relief on a ground dotted or roughened by the punch. In buying this ware the weight of the silver is first charged, and then so much per rupee is added for workmanship—a rate which varies according to the elaboration and quality of the work. This practice is universal where metal is concerned. A mechanically better finished kind of silver *repoussé* on the same principle is made at Delhi, but the forms are apt to become meagre and thread-like. The collector at times comes across large pieces of embossed silver for which there seems to be no use in our civilized life, boldly hammered up and chased, with no suicidal attempt to smooth off the marks of hammer and chisel. These, though sometimes merely coarse and clumsy, have often a quite royal effect, and seem to indicate that our Western treatment of silver is more timid and tiny than it need be.

Indian jewellery is too vast a subject to be adequately treated in so brief and general a sketch as this. The universal custom of putting savings by in the form of gold and silver ornaments necessitates the presence of a silversmith in every village. The wife of a peasant whose gross annual income is but two hundred rupees, all told, and whose house is furnished only with a bed and a few cooking pots, wears on her person from fifty to eighty rupees' worth of ornaments, and other classes in proportion. The nostrils are sometimes pierced and the ears riddled with perforations from top to bottom of the distorted lobes; the ankles are by some castes loaded with heavy, bell-studded fetters, the wearing of which would be considered a grievous punishment by a Western belle; the head is laced with chains, studs, and plates; the arm is loaded sometimes from wrist to shoulder; toe rings are common, and occasionally rings on each finger are connected by chains with a large ornament or gold-set mirror on the back of the hand. All kinds of things are used for ornaments; natural marigolds are set with plates of talc, necklaces of cloves are considered good for the headache, and are certainly pretty; pewter, iron, brass, zinc, copper, glass, horn, shell, and lac are used for bangles, tons of glass and lac being annually worked up for this purpose alone. There is material for a volume in the quaint fancies and superstitions associated with precious stones, each of which is minutely classified in all possible varieties. Each caste and race also wears ornaments of distinctive forms, and though railway travelling has diffused geographical variations, it has by no means suppressed them. Without attempting more than a reference to this subject, it may be fairly said that the jewellery by which India is known abroad, such as the gold-work of Delhi set with precious stones, pretty and occasionally European in taste; the silver filigrain of Cuttack, which resembles the dainty metal cobwebs of Malta and Genoa; the Swami gold and silver ornaments of Trichinopoly and Madras, rough with grotesque, many-armed gods, and the chiselled silver of Lucknow, are not quite the best and most characteristic forms the country can show. Among the hill people and in outlying districts are still to be found bracelets, necklets, and other gear, rough, indeed, in workmanship, but bold in design, resembling more the ornaments adorning the figures of ancient Hindu sculpture than the comparatively flimsy things made for the English market. Many of the best of these are too barbaric in general form for adoption by English or American ladies, who would object to their size and massiveness. Their simplicity, however, is real and natural, and very unlike the bald plainness the Western goldsmith attains when he cunningly strives for this precious quality.—*Harper's New Monthly*.

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Mr. J. W. Benson has had the privilege of submitting to Her Majesty a large ring made for the King of Siam, to be used by His Majesty, as head of the Buddhists in Eastern India, once a year for religious ceremonies. The centre stone, which is of great lustre, is 1¼ inches in diameter, and is enriched by a ruby, an emerald, a sapphire, and five other stones, cut cabochon shape. The mounting embodies emblems of the mystic faith of Buddhism. Mr. Benson, who has but lately returned from Siam, has recently completed other crown jewels for the same court. He has also just made to the order of the Maharajah of Jodhpur, three fine and complicated racing watches, each having the chronograph action for timing contests. They are probably intended by the Maharajah as valuable prizes for running, and the design is not only artistic but appropriate. Each portrait is enamelled with a portrait of His Highness, inside and outside the cover—and has also scenes of a spirited race on the flat, and a steeplechase enamelled in circles round the case.

Trade Notes.

An Astronomical, Chronometrical, and Meteorological Observatory is about to be established at Besançon, and this is hailed with much satisfaction by the watch manufacturers of the locality, as they will then be able to have trials of their own. The *Revue Chronometrique* says:—"Chronometers and Half-Chronometers (for the pocket), furnished with a rating certificate from the Observatory, will find a readier sale; the hands of the workmen will be stimulated in the perfections that they will strive to obtain, the principles of good construction will tend to multiply themselves in view of the Observatory trials, and the renown of our manufactures will not fail to grow."

In order to assist in securing these highly satisfactory results, the town of Besançon furnishes a site of about fifteen acres, situated in the suburbs, and charges itself with the construction of the necessary buildings for the instruments and the resident staff, at an estimated cost of 190,000 francs (£7,520 16s. 8d.), in addition to which, an annual endowment of 4000 francs (£158 6s. 8d.), to be employed in the Chronometrical service, is guaranteed.

The State contributes 30,000 francs (£1,187 10s.) towards the constructions, and an annual grant of 20,000 francs (£791 13s. 4d.).

The total cost of instruments and fittings is estimated at 130,000 francs (£5,145 16s. 8d.) including 9000 francs (£356 5s.) for the Chronometrical department, and the Minister engages to make application to the Chamber for the necessary credits to obtain them.

M. Gruey, formerly Professor of Astronomy at Clermont, has been appointed Director by the Government. He has received instructions to examine the working of the existing Continental and English Observatories.

The Besançon Chamber of Commerce, in its annual report, states that the total number of watches made in that town last year was only just short of half a million, or nearly fifty thousand more than in 1881, when the total was 448,680, the average for the preceding five years having been 440,000. The proportion of gold to silver watches throughout this period has been about one of the former to two of the latter, and taking the average value of the gold watch at £3 8s., and that of the silver watch at £1, the Chamber of Commerce estimates the total value of the goods manufactured last year at a trifle over £900,000. The number of watches imported from abroad is diminishing every year. In 1881 there were imported 32,156 gold and 70,554 silver watches, but last year the total had fallen to 28,218 gold and 48,704 silver watches, and nearly all of these came from Switzerland. In other words, the total number of watches sold in France last year was 568,722, of which 86 per cent. were made at Besançon.

The watch trade in Switzerland employs more hands than any other industry in that country. According to the most recent statistics, the number employed in the manufacture of watches is 40,000.

Captain Webb, whose untimely end must be deplored by all, was presented with a gold keyless hunting fusee chronometer, after the successful accomplishment of his task of swimming across the English Channel.

Mr. Bryce-Wright writes: "A so-called new 'gem' (violane) has been lately introduced into the London market from Paris. Many collectors of 'pierres de fantassie' have purchased these 'precious stones' at very high prices, perhaps thinking they are a new and transparent variety of the mineral violan, a dark violet blue variety of pyroxene. Such is not the case. They are simply imitations of the amethyst, made of glass, with an admixture of potash and borax. The metallic oxides are nearly absent, the specific gravity of these 'precious stones' being only 2.26. They are easily scratched with quartz, and under the dichroiscope show naturally no extraordinary ray. I have just received for examination a specimen, for which the sum of £50 was given; its true value is about two shillings."

At the Clerkenwell County Court, before Mr. Eddis, Q.C., Judge, Mr. Jules Nordmann, 13, Hatton Garden, sought to recover from Charles Lewis, of 124, Church Road, Islington, a sum of £27 10s. 6d., value of watches supplied. Defendant admitted the claim, less a sum of £3 10s., subject to a counter-claim of £28 12s. 6d., amount earned as commission. The case for the plaintiff was that he had supplied goods to defendant between December, 1881, and December, 1882, to the amount of £93 9s., of which sum £65 18s. 6d. had been paid, leaving the amount of claim in dispute. The evidence on defendant's counter-claim was that the Salvation Army had advertised for tenders for the supply of a large number of watches, that plaintiff submitted a tender and a pattern watch to the principals. Defendant, it was said, had drawn plaintiff's attention to the advertisement, and had suggested a motto to be placed upon the dial plate of the watches, which he thought would prove attractive. He further said an agreement had been come to between himself and plaintiff's manager, that if Mr. Nordmann was successful in obtaining the order, he (defendant) should have 2½ per cent. commission. The order was obtained, and 1,300 watches supplied, there appearing on the dial-plate of each, "Every hour for Jesus." Upon this defendant claimed commission, which plaintiff repudiated alike on the ground that his manager had no authority to enter into such special agreement, that the idea of the inscription was not a novel one, and also that it was not through the instrumentality of defendant that the order was obtained. The Judge found for the plaintiff, both on claim and counter-claim, with costs.

A Dublin Correspondent sends us the following:—"In the Northern Divisional Police Court here, recently, William O'Kelly, of Wood Quay, and Hannah O'Kelly, his wife, were charged with illegally pawning watches entrusted to them. The male prisoner, a watchmaker and jeweller, was in the habit of receiving watches from private customers for the purpose of cleaning them, &c. Several persons who had thus entrusted watches to him could not "get sight of him" when they called. At last, complaint was made to the police, and on inquiry it was ascertained that both the male and female prisoners were in the habit of pawning watches at the various establishments in the City. Four more watches were now produced by the police, recovered from pawn-offices and identified by customers. The tickets were found at the prisoner's residence. Several other persons were in court seeking to recover property thus lost. The Magistrate, in granting a remand for the purpose of obtaining further information, permitted the female prisoner to be held to bail, remarking that probably any jury before which the case would be taken, would hold that the wife was acting under the coercion of her husband. A doubt having been expressed as to the prisoner's marriage, Mrs. O'Kelly, who was much agitated, stated that she was married at St. Mary's Chapel."

Assaying Gold.

Abolition of the "Carat" System.

In the thirteenth annual report of the Deputy Master of the Mint, just issued, reference is made to the abolition of the old "carat" system. The following extract from a letter by Professor W. Chandler Roberts, chemist to the Mint, points out the respective advantages of the carat and the decimal system:—"I beg leave to submit the following statement as to the method now in use for reporting the results of assays on ingots of gold imported for coinage. The essential facts are well known, and may be briefly set forth as follows:—In assaying coin, and the bars into which the metal imported for coinage is melted, the result of each assay is expressed decimally, fine gold being taken as the unit of comparison, or as 1000, and the standard prescribed by law for gold coin being 916·6. This system has long been adopted on the Continent and in the Australian mints, but in this country, side by side with it, a much older one is employed by the Mint, and by jewellers and others. The latter system consists in recording the alloy as being so much 'better' or 'worse' than standard, and is founded on an ideal unit, the 'carat pound,' which is divided into twenty-four parts, called carats, British standard gold containing twenty-two carats of gold and two carats of alloy metal in every twenty-four parts. The carat is further subdivided into four parts, termed 'carat grains,' and the grain into eight parts, the smallest division of the carat scale being thus the one-eighth of a carat grain, or the 1-768th part of the carat pound. In order to attain a still greater degree of minuteness, the eighth part of a carat grain is further subdivided into seven and a-half parts, or 'excess' grains.' Each of these final divisions is thus the 1-5760th part of the carat pound, and as the troy pound also contains 5.790 grains, each excess grain of gold beyond the last eight in the assay report is reported as an 'excess grain of gold on the troy pound.' From the point of view of convenience or accuracy in recording the results of the operations of assaying, the carat system is not found to present any difficulty when the operator is familiar with its use. It should further be pointed out that the system is very convenient to those who are accustomed to conduct commercial transactions in the precious metal, on the basis of the alloy known as standard gold; but it has the disadvantage of being unintelligible to those who employ the decimal system, and who are therefore in the habit of mentally referring to pure gold as 1000. It is even found wanting in clearness by many who are conversant with the ordinary operations of coinage or bullion transactions. For instance, the meaning of 'worse 01$^{5}/_{8}$ *plus* 1,' as the assay report of an ingot, is at least obscure, while the equivalent statement that the standard fineness of the ingot is 900, at once suggests that 1000 parts of the metal contains 900 parts of gold."

◆

Did Archimedes first determine the Ratio of Circumference to Diameter?—According to later discoveries, the Hindus had formed an expression long before Archimedes, which gives the ratio of diameter to circumference as 1,250 to 3,927, and which only varies from the more correct ratio by 0·0000074. This was only superseded in the 17th century by the ratio (113 : 355) given by Huelius Mota. Apart from this, the Hindus possess a great number of progressions used in analytical geometry expressed, and the applications of which are shown in Sanskrit verses.—*Allgemeine Journal der Uhrmacherkunst.*

Kabyle Jewellery.

(*Continued from page* 16.)

It is very difficult now to purchase any good Kabyle jewellery in Algiers. The tribes near that town were some years ago severely tried by famine, and they sold all their available ornaments, while those who joined in the insurrection of 1871 were very heavily fined, and the trinkets of the women were swept away in the endeavour to raise funds sufficient to pay off those fines. A good necklace (when it can be found) costs about three guineas; a fairly good brooch, and some classical pins, may yet sometimes be picked up in the town; as Kabyle women (like their husbands) are litigious, and will come into Algiers expressly to sell their jewellery, to procure legal advice. Otherwise they will not part with their treasured trinkets, but are often rich in coral and amber ornaments. A merchant has assured me that there are no better judges of both, and that they will not purchase inferior qualities. They do not care about having coral in the form of beads, but show their good taste by preferring it in its natural form, only having it cut into pieces of convenient size, and polished. The common people often wear it quite rough. A woman who possesses the necessary funds will often adorn herself with sixteen pounds of coral and amber, thereby exciting the envy of all her friends: whereas, if she were a slave, and compelled to support that weight of one of the baser metals, she would arouse the sympathy of all beholders. At the hot baths of Hammam R'Irha, Kabyle women often bathed in a complete suit of jewellery, and sometimes refused to remove their enormous head-dresses. These edifices must take a long time to build up, and as the women often come long distances to the baths, they may object to wasting time in undressing their heads, preferring to spend all the time in the water. Their jewellery is probably fastened underneath the structure, and cannot easily be removed. As, too, they have very few opportunities of exhibition, their appearance in all their war paint is not unnatural.

Silver-gilt jewels are sometimes offered for sale in Algiers, with Kabyle enamelling on them; but the ornaments are more Arab than Kabyle, and have probably been made to order. In weighing materials, workmen make use of little scales of European manufacture. The stiff geometrical designs which appear on Kabyle pottery and woven stuffs, and give so characteristic and original an impress to these manufactures, do not have any part in the jewellery, but give place to more easy and flowing lines. The whole of the jeweller's art seems governed by a different vein of feeling, and to draw its inspiration from another and more educated source. As the jeweller's trade is entirely in the hands of men, while women alone are potters and weavers, it is possible the two sexes are following totally different traditions.

Aït-el-Arba, one of the centres of the jewel trade, is also celebrated for the manufacture of base money. Kabyles have always been renowned for "coining." At one time the fabrication of false money was carried on among them on a very large scale. The coins of Morocco, Tunis, and the old Regency of Algiers were the principal objects of imitation, as the Kabyles have always found it impossible to copy a head. Their only way of reproducing French money is by casting it in a mould, when the copy is always smaller than the original. The metal used is silver, with an alloy of tin and brass, according to the fancy of the maker. It is melted in the same crucibles as those made by the Yenni tribe for the use of jewellers. False money was usually made to order. Strangers from a distance came into the country and took away large quantities to put into circulation in their own neighbourhoods. The sale of false money was permitted in the markets; but the Kabyles repressed with extreme severity any attempt to pass it in their own villages. Any one discovered in such an act was stoned on the spot. The workers, by a singular scruple, never passed their coins themselves, seeming to think they would be dishonoured by entering on such a commerce. Still I have heard of a Kabyle who, seeing some French money, succeeded in imitating it exactly, and then brought it in triumph to show to friends in Algiers. He appeared quite unconscious of having offended in any way against the law; but he had to be punished—*pour décourager les autres.* It is believed that only one attempt has been made by Kabyles to imitate gold coinage—in 1862; but the money was so light and badly made that the "smasher" was at once condemned, and the attempt has not been repeated. The coins were of tin, washed over with a liquid obtained from Algerine Jews: the workmen engraved on steel by means of bi-chloride of mercury; and they also inlaid silver on iron. Some amulets thus treated have a very good effect. Like our engravers, they also work *au burin,* and operate directly with the dry point of the hammer on the metal to be engraved, which may be silver, brass, or iron. They also inlay silver on wood. Their tools are of home manufacture, and are exactly analogous to ours, but are not so carefully finished. They engrave seals, inscriptions on arms, and so forth. It would be very easy for them to form among themselves a school of skilful workmen; for they possess the quick, impressionable, artistic nature, and with training and example should be capable of much.—*Magazine of Art.*

Index to Antique Rings and Ornaments.

92—A gold enamelled ring, set with a large turquoise in the centre, surrounded by six raised garnets, and which forms part of the Waterton collection.

93—This ring is of very peculiar design. It is set with three stones in raised bezels; to their bases are affixed by a swivel, gold pendant ornaments, each set with a garnet: as the hand moves, these pendants fall about the finger, the stones glittering in the movement.

94—From the Londesborough collection. The sides of the hoop are highly decorated with flowers and scroll ornaments, also richly enamelled.

95—From the Londesborough collection. The ring, as closed and worn on the finger, is shewn in the uppermost figure. The lower figure shews the ring parted, displaying the inscription on the flat side of each section, which is also enriched by engravings.

96—From the Londesborough collection. It fully illustrates Dr. Nare's remark "that gimmal rings, though originally double, were, by further refinement, made triple, or even more complicated: yet the name remained unchanged."

97—From the Londesborough collection. The ring is of gold, enamelled, the skeletons being made still more hideous by a covering of white enamel.

98—A silver ring of East Indian workmanship, discovered in tho ruins of one of the most ancient temples: to its centre are affixed bunches of pear-shaped, hollow drops of silver, which jingle with a soft low note as the hand moves.

99—From the Londesborough collection. The face of the ring, its back, and side portions of the shank, are decorated with engraved scroll work, filled in with black enamel.

Patents.

BRITISH PATENTS.

Applications for Letters Patent.

3,046. Alexander Melville Clark, of the firm of A. M. and W. Clark, of 53, Chancery Lane, in the county of Middlesex, Fellow of the Institute of Patent Agents, for an invention of "Improvements in or connected with Lathes for the use of Watchmakers, Jewellers, and others."—A communication to him from abroad by Herman Milton Potter, of Williamsport, in the county of Lycoming and State of Pennsylvania, United States of America.

3,276. Alexander Melville Clark, of the firm of A. M. and W. Clark, of 53, Chancery Lane, in the county of Middlesex, Fellow of the Institute of Patent Agents, for an invention of "An Improvement in Clocks."—A communication to him from abroad by Victor Emile Versepuy, of Paris, France.

France.

Certificates of Addition.

116,210. Collin, for "Alarm Clocks."

146,136. Lioret, for "An Alarm-Watch."

149,141. Knudson, for "An Electric system, combining the Printing Telegraph with Clocks or Chronometers."

United States of America.

278,347. Charles H. Lucas, of Canton, Me., assignor of one-half to Walter W. Chaffin, of the same place, for "A device for fitting Hair-Springs to Watches."

278,550. Gardner L. Holt, of Springfield, Mass., assignor to William H. Robertson, of Brooklyn, N.Y., for "A Watch-Key or Holding-Tool."

271,572. Francis T. Marchand, of Annapolis, Md., for "Maintaining power for Clock-Springs."

278,609. Jas. E. Searing, of New York, N.Y., assignor to Robbins and Appleton, of the same place, for "A Watch-Case."

278,781. Marks C. Davis, of Indianapolis, Ind., for "A device for Adjusting Clock-Pendulums."

278,846. Henry L. Bailey, of Brooklyn, assignor to the Time Telegraph Company, of New York, N.Y., for "An Electric Circuit and apparatus for Synchronizing Clock-Pendulums."

278,871. Hiram Camp, of New Haven, Conn., assignor to the New Haven Clock Company, of the same place, for "A Clock-Bell."

278,946. John Happersberger, of Cincinnati, Ohio, assignor to the Cincinnati Electric Clock Company, for "An Electric Clock Movement."

278,947. Jasper F. Harden, of New Plymouth, Ohio, for "A Watch-Fob."

279,022. Aaron C. Sanford, of New Haven, Conn., assignor of one-half to George W. Sanford, of the same place, for "A Clock-Bell."

279,143. Benjamin Franklin, of Chicago, Ill., assignor of one-half to Francis E. Morse, of the same place, for "A Calendar Clock."

279,176. Frank A. Mills and Thomas A. Mossop, of Philadelphia, Pa., for "A Compensating Pendulum."

279,196. Curtis A. Smith, of Elgin, Ill., assignor to Robert Carl, of the same place, for "A Self-Adjusting Watch-Key."

279,327. Chas. E. Buell, of New Haven, Conn., for "A combined Telegraph and Clock system."

279,828. David Shive, of Philadelphia, Pa., assignor of one-half of B. F. Du Bois, of the same place, for "A Compensation-Pendulum."

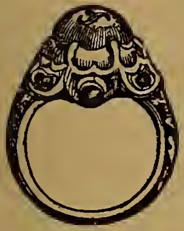
279,850. Jas. E. Young, of Genoa, N.Y., assignor of one-half to Orlando M. Avery, of the same place, for "A Calendar-Clock."

German Empire.

23,134. E. Gutt, of St. Georg-Hamburg, for "A Fly-Wheel for Watchmakers."

23,380. J. Fritz, of Paris, for "A Safety Ring for Watch-Chains, Jewellery, &c."

ANTIQUE ✣ RINGS ✣ & ✣ ORNAMENTS.



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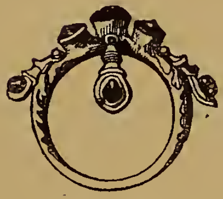

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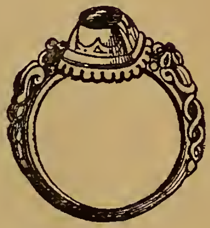

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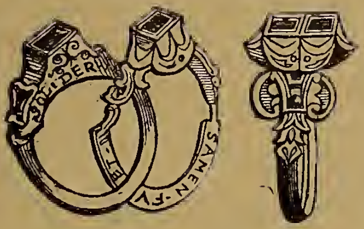

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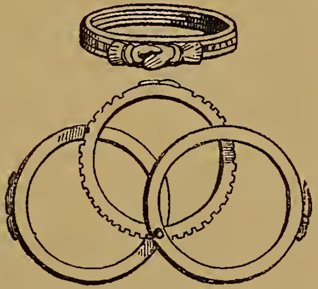

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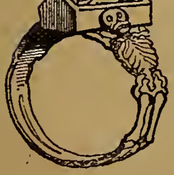

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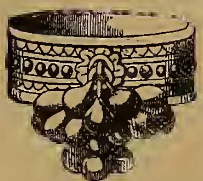

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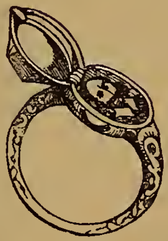
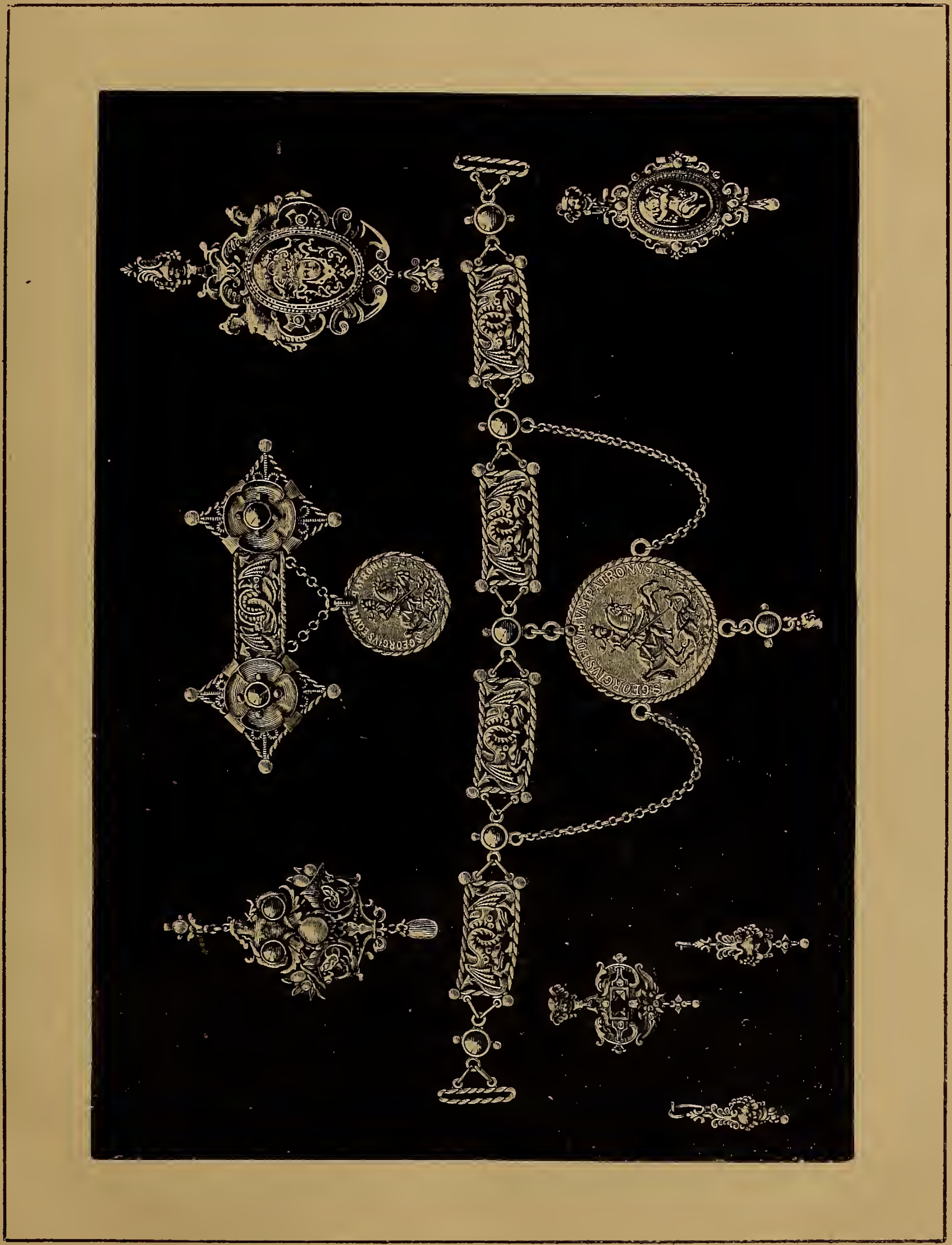


99.

For Description, see page 30.

MONTHLY SUPPLEMENT OF DESIGNS.



THE WATCHMAKER JEWELLER AND SILVERSMITH

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The Manufacture of Repeating Watches.

THE *Journal Suisse d'Horologerie*, in its June issue, contained the first of a valuable series of practical papers from the pen of Mr. John Huguenin, President of the Horological Section of the Society of Arts at Geneva, a perusal of which is sufficient to demonstrate that the right man is in the right place. To our critical readers we must apologise for any liberties which may have been taken in the translation, but it is often difficult to find suitable equivalents for technical terms.

The chief lesson that we would draw from it is, that the minute examinations and alterations of the movement which, to the non-professional eye, would appear absolutely perfect, could not possibly be performed other than by the hand of a skilled workman, who can only learn his business by actually making every part himself. Machinery is invaluable up to a certain point, but in watch-work it must be supplemented by human brains and fingers.

Before taking a repeating movement to pieces, to get the escapement made, it should be ascertained if it is necessary to raise the dial by an edge (silver), in order that the hour-wheel and the cock over set-hands-wheel can have sufficient freedom, without the examiner being obliged to thin them too much, or to cut away the back enamel of the dial.

If it is a minute repeating movement, care must be taken to make sure that the height of the snails agrees properly with that of the quarter and minute pieces, to determine exactly the definite position of the cannon pinion, of the hour and minute wheels, and to exactly calculate the necessary height for the dial; one will thus avoid lost room, which will be doubled when the case is made, if the pendant is planned to come in the middle of the band.

Be certain that the space between the centre and third wheels is sufficient for the balance, reckoning the height of the rim equal to half that of the main-spring. If the space is not judged sufficient, the third-wheel ought to be lowered with care before the holes are jewelled; the face of the third pinion must be kept a little higher than the centre-wheel.

If it is not possible to lower the third-wheel, the two wheels must be thinned as much as possible, and the height of the rim of the balance carefully reduced.

It is to be remarked in certain pieces that the leaves of the fourth pinion are not sufficiently free of the circumference of the balance, of which the diameter is generally equal to that of the barrel-cover; in this case, the leaves ought to be lowered, so that the face of the pinion is only one-tenth of a millimetre above the third-wheel, that being properly in its place.

If the pinion only wants lowering a little, solely to ensure its not fouling the balance-screws, it would be more simple to lower the fourth-wheel; this would obviate re-cutting the hollow, and re-polishing the face of the pinion.

These operations ought to be done before planting the escapement, in order that the escape pinion and the balance staff may be pivoted in agreement with the new positions of the third and fourth wheels.

Then examine if there is sufficient space between the end of the "surprise" and the centre part of the barrel cover. In the contrary case, the examiner ought to make the freedom, after having verified the depth of the barrel in the centre pinion.

When the setting hands pinion touches on the edge of the barrel cover, the examiner should note before turning it up that the gearing of the sliding pinion for setting the hands will permit of it.

The striking work of minute repeaters for hunters is so arranged that there is a danger of the quarter piece, on which are the three teeth which act against the lifting of the small hammer, fouling the finger of the stop-piece. The examiner is recommended to get the stop work as low as possible, and to drill the barrel arbor with a sufficiently small drill, so that the pin may be partly sunk in the thickness of the finger-piece.

In these same pieces the spring of the quarter piece passes over the lowest part of the barrel cover and under the quarter snail. This part of the cover ought to be turned level with the bottom of the plate; this will allow the blade of the spring to be left sufficiently broad to prevent it riding up in working.

The opening in the brass edge of the pillar plate for the arm of the rack is often longer than necessary to limit the return at the moment that the stopping is effected. It is expedient, before taking off the striking work, to mark by a line on the plate, the position of the arm entirely brought back, in order that the maker of the slide may have an indication to limit the length of the draw, so that there shall be no play after it has been fully drawn up.

Mark on the plate the places for the case screws, so that one of them may be near the foot of the bells, and that the blocks may not be in the way of the case springs, or of the slide.

Before taking off the keyless and repeating work, select a place for stamping the number.

Planting the Escapement.

The proportions which have been indicated for the diameter and height of the rim of the balance are not always able to be adhered to, and may have to be modified to suit the calliper.

When the bell of the large hammer requires the balance being drawn off, the diameter of the latter should be reduced, in order that the escapement-maker may not break into the countersink of the screw in freeing the centre-wheel bar.*

In certain pieces the fourth-wheel arbor does not allow of a balance being as large as the barrel cover; the calliper is also sometimes arranged that the teeth of the barrel are too close. Balances with higher rims should be used for these escapements, if the space between the centre and third-wheels permits. It is well to order screws of 14 and 18-carats, in place of the low quality gold that is usually used.

For a general rule, it is necessary to calculate the diameter and height of the rim of the balance, in agreement with the strength of the mainspring and the quality of the escapement, in view of obtaining a vibration not less than a turn and a-half, the mainspring being fully wound up. Its complete development varies between six turns and six turns and a-half for a stopwork of four turns, and from seven turns to seven turns and a-half with a stopwork of five turns. With these conditions the occasional drags, caused by the repeating mechanism, will exercise no influence on the performance of the watch.

The large train-wheels ought to be given out to the escapement-maker, also the hour hammer, that the foot of balance cock may be freed of it.

To be Continued.

City and Guilds of London Institute.

The Fifth Examination in Technology, under the direction of the Institute, was held on the evening of May 30th. Edward Rigg, Esq., M.A., the examiner in Watch and Clock Making, reports as follows:—"The number of candidates presenting themselves continues to steadily advance, and I consider that, as a whole, this year's papers show more signs of reading than those of previous years."

The following are the names of the successful candidates as published in the Pass List (22 in all), although it is stated in the analysis that 24 passed out of 33.

	Honours.	Ordinary.	Prize.
Coventry—*St. Peter's School:*			
Farmer, Joseph John ..	—	2	——
London—			
Bath Street Board School:			
Best, Thomas	—	1	——
Bontoft, Robert Johnson	—	1	1st. £3 and Silver Medal.
Durrant, William, J. ..	—	2	——
Elliott, Henry Melvill ..	—	2	——
Hoist, William	—	2	——
Kain, Edward Arthur ..	—	2	——
Polytechnic:			
Gould, Ernest Harry ..	—	2	——
Hewitt, Thomas	—	1	——
Jarvis, George Charles ..	—	1	——
Pearse, George Thomas ..	—	1	——
Smith, John Bolton ..	—	1	——
Weeks, Charles	—	2	——
Technical College, Finsbury:			
Barnsdale, William J. ..	—	1	——
Freebody, Charles ..	—	2	——
Glasgow, David	1	—	2nd. £5 & Bronze Medal.
Milne, Robert Kydd ..	—	1	——
Morrison, Ernest J. ..	—	1	3rd. £2 & Bronze Medal.
Perrett, Arthur Locock ..	—	1	2nd. £3 & Bronze Medal.
Southborough—*The Library:*			
Aggett, John	2	—	——
Sunderland—*School of Art:*			
Morton, William	—	2	——
York—*Minster Yard School of Art:*			
Spiegelhalter, Edmund K.	1	—	——

No candidates presented themselves for examination in silversmith's work.

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* A "bar" movement is being described. We have omitted two paragraphs which have no significance in a three-quarter-plate, as invariably used here.

The Worthies of Horology.

By C. Stuart Murray.

XV.

THE CLOCKMAKERS' COMPANY.

Second Part.

I STATED in the conclusion of my last paper that I would give in the next one some curious outlines from the journals of the Clockmakers' Company, interspersed with other matter. I said, also, that this celebrated confraternity was the outcome of an agitation and petitioning that had been going on for some time previously. This agitation was during the reign of James the First, and in the year 1622, the clockmakers of the City made serious complaints to the King against foreigners encroaching upon the horological trade of London. They petitioned that no such persons should be allowed to work except under English master-men; furthermore, that no foreign clocks be permitted to come into this country. The aggrieved petitioners were very earnest and very angry, and kept the heat of their wrath up to a satisfactory temperature for a number of years. However, James I. having passed away, and the First Charles having been seated on the throne, the long wished-for incorporation was obtained in a charter granted in the seventh year of that king's reign, dated the 22nd of August, 1631. Then the "Masters, Wardens, and Fellowship" of the art and mystery drew their swords and swore eternal friendship against all outsiders, for ever and ever, Amen. And they carried it out, as was partly seen in the first part of this paper in our last number.

Here is the promised roll of the first members:—

Master.

David Ramsey, Esq.

Wardens.

Henry Archer. John Wellowe. Sampson Shelton.

Assistants.

James Vantrollyer.
John Harris.
John Charlton.
Richard Morgan.
John Midnall.
Edward East.
John Smith.

The first meeting of the Company was held on the 12th of October, 1632, and at the second meeting, held on the 16th of October, the following applicants were sworn and admitted as the first freemen:—

Robert Rothwood.
John Brooke.
Peter Hues.
Thomas Shepherd.
David Bouquet.
Thomas Howse.
William Daniel.
Lewis Cooke.
Thomas Okeham.
George Clarke.
John Bull.
Richard Lord.
Richard Mason.
Richard Grose.
Matthew Browne.
Onesiphorus Helden.
Oswald Durant.
Josias Cuper.
Ely Volant.
William Petit.
John Droneshont.
John Walker.
Thomas Ware.
Robert Holloway.
William Daniell.
Daniell Saunders.
Nicholas Fetter.
William Barker.
Francis Stephens.
Thomas Holland.

In the following year, 1633, the list of freemen was considerably enlarged by the following names:—

William Selwood.
Thomas Dawson.
Richard Child.
Robert Grinkin.
Edmund Gilpin.
Thomas Lambe.
Richard Jackson.
George Smith.
William Almont.
Francis Torrado.
Simon Hackett.
Thomas Alcock.
John Burgis.
Thomas Vecue.
John Bulby.
John Nicasius.
John Hertford.
Timothy Gray.

From this list it will be seen that the first roll of Master, Wardens, Assistants, and Freemen, numbered sixty-two; a very respectable commencement.

One somewhat singular feature in connection with the Company has been occasionally remarked upon; and that is the extraordinary absence from their journals of any mention of the application of the pendulum to clocks, in lieu of the old bar balance, which change took place in 1657, or of Dr. Hooke's "balance-wheel spring," as it was called, to watches, which made its appearance publicly in 1676.

Now, the whole history and practice of horology has no such equal scientific improvements to boast of; yet, here were the great landmarks of such history—landmarks that have revolutionised the art of timekeeping—and the Company by some strange, unaccountable oversight, passed their advent silently by. Nor, is anything said of the great Rebellion, or of the execution of Charles I., who gave them their charter. The reason for these omissions has been stated to be that the particulars never came before them in an official form; therefore, could not be considered as matters to be noticed in their "Transactions."

Looking again at the names of the first members of the Company, we are led to the conclusion that there were some foreigners among them. For instance, there is that of "Vantrollyer," which smacks a little of what was then Flanders. The name of Helden, takes us up the river Scheldt, in the same direction. Torrado has a Spanish flavour about it, whilst Vecue, and Nicasius, seem to point towards Italy. Notwithstanding their outcry against foreign tradesmen, it is not unlikely but that the fathers of the Company found them to be talented men, well-established in business, otherwise agreeable, and so admitted them into the Fellowship.

It is quite clear, from what records have been left to us that those men had their souls thoroughly in their work, and that such earnestness and judicious administration of large punitive and summary powers exercised on the side of excellence—onward and upward being their continual aim—had much to do with laying the foundation for that long range of super-eminence which high-class English horological instruments has enjoyed, and does enjoy to the present day.

One of their principal complaints was, that foreign watchmakers were imitating and counterfeiting their work. We obtain an interesting insight into the trade of that day by glancing over the journals of the Company.

1635.—Mr. Warden Midnall hath a brass watch which he had obtained from Mr. Warden Harris, for which Mr. Warden Harris was to pay 40s.

1636.—We have the following particulars in the accounts of a "Translation" of a Mr. Masterson to the Clothworkers' Company:—

	£	s.	d.
Given the Clothworkers a Silver Cup	1	10	0
Item, a Watch	4	0	0
Item, a Clock	3	0	0

1661.—The movement of Mr. Marston, which was seized at the late Court for deceitful work, was condemned, and by his not appearing on being warned, he is by the Court fined 40s.

Searches were made eastward and westward.

1666, Aug. 20.—It is recorded that the last meeting of the Company before the Great Fire of London was held at the Castle Tavern, Fleet Street; and on October 8th, the first meeting after, was held at the Crown Tavern, Smithfield; but the Great Fire is not mentioned.

1667.—Mathematical instrument makers were first admitted into the fellowship of the Company, and searches for the examination of measures of length were now first made.

1668.—At a search of the clockmakers and three mathematical instrument makers, who were assistants, in the shop of Samuel Morris, ironmonger, at the sign of the Dripping Pan, near Charing Cross, three yards, and two jointed two-foot rules were seized.—Also, in the shop of Byfield, ironmonger, near the Chequers, Holborn Bridge, three plain joint rules and one brass joint rule were seized, not being agreeable to the standard.—At a subsequent Court the several parties appeared, the measures were broken and returned to them, on promise of being corrected before they were again exposed to sale.

1671.—There is for this year an entry of an indenture, being a receipt from the Exchequer for three brass standard yard measures, which had been made according to the statute 12th Henry VII., and provided, together with cases for them, by the Company, for the Exchequer.

I may here turn aside for a minute or so, to say a few explanatory words about the entry above of the year 1671.

The earliest recorded standard of length in this country' says the present Warden of the Standards, Mr. Chisholm, was the yard or *gird* of the Saxon kings kept at Winchester. King Edgar is stated to have decreed, with the consent of his wites, or council, that "the measure of Winchester shall be the standard." The yard and the ell were originally identical measures in England. From the period of the Conquest, down to the time of Richard the Second, the statutes and official documents were either in Latin or in Norman-French, and the yard and ell (*virga* or *verge*, *ulna* or *aulne*) are employed indiscriminately to indicate the same unit of length. The sense in which the distinctive words are used above is, that *virga* signifies a rod—that is, a measuring rod, and *ulna*, the elbow, or an ell. In the clause of Magna Charta relating to weights and measures, the term *ulna* is used as the unit of cloth-measure, whilst in Doomsday Book, land measured by the yard is called *terra virgata*. The identity of the yard and ell is also clearly established by the old statute of uncertain date, prior to the reign of Edward the Second, entitled *Compositio ulnarum et perticarum*—the union of the ell and measuring rod—in which we find the well-known rule laid down, that three barleycorns make an inch; twelve inches a foot; three feet an ell (ulna); five-and-a-half ulna a perch; forty poles in length, and four in breadth, an acre.

Another old statute, of the year 1439, is worthy of notice. It is the 28th Henry VI. c. 16, and is thus translated in the statute-book:—

"There shall be but one measure of cloth throughout the realm, by the yard and the inch (*la alna et le pous*), and not by the yard and handful (*la alne et la pleyne mayn*), according to the London measure."

Later Acts, down to the 5th and 6th Edward VI. c. 6, continue the measure of cloth "to every yard one inch containing the breadth of a man's thumb," or to every yard one inch of the standard. No such provision is contained in any later cloth Act; and it should be observed, that the oldest English standard of length now existing, consists of the Exchequer yard of Henry VII. alone.

On the other hand, the Exchequer standard yard, constructed in Queen Elizabeth's reign, has also the cloth ell of forty-five inches marked on the same bronze bar, both being bed measures, into which the standard yard and ell rods respectively fit. It is remarkable that, although the standard ell itself exists, there is no mention of an ell forty-five inches in any statute, nor in the existing records of the standards of Henry VII. and Queen Elizabeth.

The existing imperial yard is so nearly identical in length with those old standard yards of Henry VII. and Queen Elizabeth, that it exceeds them by little more than a hundredth part of an inch, a difference frequently found in foot-rules, now commonly used. There can also be but little doubt that our imperial yard is substantially the same length as the old Saxon yard. We have no further direct trace to its origin. But the English yard is so nearly the same length as double the natural cubit of the Egyptians and Hebrews, and the English foot is so nearly identical with the ancient foot, two-thirds of this cubit, that the origin of these two English units of length may not improbably be traced to these two earliest standard units. We know that the double cubit was used in ancient times as a measure of length. An old Egyptian double-royal cubit, found in the ruins of Karnac, may be seen in the British Museum. We know also that a measure, very nearly equal to two natural cubits, was used by the Romans under the name of *ulna*, or ell. The *ulna* is mentioned by Pliny, when describing the measurement of the girth of a tree, as half the length of the extended arms of a man. It may thus be fairly assumed that the measure of the double natural cubit, or three feet, under the name of ell, or yard, came into use in old times, as a very convenient measuring unit, and found its way into England as the standard unit of length.

For further information in this direction, I can confidently recommend the reader to *Weighing and Measuring*, by the Warden of the Standards, published by Macmillan & Co.

In consequence of the entry in the journals of the Clockmakers' Company, referring to the statute 12th of Henry VII., I have been more explanatory upon that point than I would otherwise have been, the statute being so important. The year upon which it was passed answers to 1496 of the calendar.

The yard of Henry VII. being the oldest standard now existing, we, with our thousandths and millionths of an inch, can see from what our gauges have been formed, and with the perfection to which we have attained may look back with a certain degree of wonder at what to us appears the rude methods of bygone times. But when the clock and watchmakers got to work among them, then began the improvement of inch measuring upon something like scientific principles. The new artists were compelled to have small gauges for their pinions, wheels, pivots, &c., and to make them themselves. They had no micrometer microscopes in those days, nor no expansion tables to read off to five and six places of decimals, elongation of rods and bars. To be sure there were Napier's logarithms, Brigg's new decimal notational basis for them, and Gunter's celebrated, and equally valuable, "lines" of the same character. The sliding-rule, as we have it now, had not then come into existence, although the principles had; whilst the value of Gunter's line of numbers could only be brought out by means of a pair of compasses. To the Rev. William Oughtred, an eminent mathematician of the time, the scientific calculating world is indebted for another great advancement. He adopted the method of laying one rule against another, and *sliding* them together, backwards and forwards, in his computations. He had long looked upon the compasses as both tedious and troublesome, and studied much to get rid of them. Hence, from the happy thought of using the two rules in the way just spoken of, came the well-known sliding-*rule*.

We read, too, from the interesting diary of that charming gossip, Pepys, who was secretary to the Admiralty in the time of Charles the Second, some particulars concerning our subject in his day. Writing about his movements on the 10th of August, 1664, he says of himself:—"Abroad to find out one to engrave my tables upon my new sliding-rule, with silver plates, it being so small that Browne, who made it, cannot get one to do it; so I got Cocker, the famous writing master, to do it, and I sat an hour beside him to see him design it all; and strange it is to see him, with his natural eyes, to cut so small at his first designing it, and read it all over, without any missing, when, for my life, I could not, with my best skill, read one word or letter of it." In the following day's entry the quaint chronicler writes:—"Comes Cocker, with my rule, which he hath engraved to admiration for goodness and smallness of work; it cost me fourteen shillings the doing."

This was the celebrated original of "According to Cocker." Although he gave his name to the famous arithmetic, he was chiefly known as a skilful writing-master and engraver. After his death a new edition of his book came out, having his portrait on the frontispiece, under which were the following lines:—

> "Ingenious Cocker! (now to rest thou'rt gone),
> Noe Art can show thee fully but thine own,
> Thy rare *Arithmetick* alone can show
> Th' vast *sums* of thanks we for thy labour owe."

I will now conclude the second part here; nor could it be more appropriately ended than at that entry in the journals of the Clockmakers' Company, relative to the standard yard of Henry VII., and the historical information which I found immediately belonging to it. I hope that it has interested the reader as much as it has interested me.

Guide to Calculate the Value of Gold and Silver after the various Assay Reports.

By H. Bush, Hull.

(*Continued from page* 133.)

Anent the table for conversion of the Oz., Dwt., and Grain Weight into the French and Russian Weights, and to meet the requirements of the continually increasing International Commerce in the Jewellery and Silverware Trade, the following table will afford approximate equivalents of the Gram Weight reduced to English and Russian Weights for precious metals:—

The Gram Weight is divided into—

1 Kilogram = 1,000,000 Milligram.
1 Hectogram = 100,000 ,,
1 Dekagram = 10,000 ,,
1 Gram = 1,000 ,,
1 Decigram = 100 ,,
1 Centigram = 10 ,,
1 Milligram = 1 ,,

1 Kilogram = 1000 Grams.

		Oz.	dwts.	grs.	Decimal oz.	Solotnik.	Doli.
1000	Grams	32	3	0·34	32·150	241	12
900	,,	28	18	17·10	28·935	217	1·2
800	,,	25	14	9·86	25·721	192	86·4
700	,,	22	10	2·63	22·505	171	75·6
600	,,	19	5	19·40	19·291	144	64·8
500	,,	16	1	12·17	16 075	120	54
400	,,	12	17	4·03	12·860	96	43·2
300	,,	9	12	21·70	9·645	72	32·4
200	,,	6	8	14·46	6·430	48	21·6

1 Hectogram = 100 Grams.

		Oz.	dwts.	grs.	Decimal oz.	Solotnik.	Doli.
100	Grams	3	4	7·23	3·215	24	10·8
90	,,	2	17	20·80	2·893	21	67·5
80	,,	2	11	10·58	2·572	19	28
70	,,	2	5	0·25	2·250	16	84·5
60	,,	1	18	13·92	1·929	14	45
50	,,	1	12	3·60	1·307	12	5·5
40	,,	1	5	17·29	1·285	9	62
31·10	,,	1	0	0·00	1·000	7	48
30	,,	0	19	6·97	0·965	7	22·5
20	,,	0	12	20·64	0·644	4	79

1 Dekagram = 10 Grams.

		Oz.	dwts.	grs.	Decimal oz.	Solotnik.	Doli.
10	Grams	0	6	10·32	0·321	2	39·5
9	,,	0	5	18·88	0·290	2	16·8
8	,,	0	5	3·45	0·257	1	89·6
7	,,	0	4	12·02	0·225	1	66·4
6	,,	0	3	20·58	0·193	1	43·2
5	,,	0	3	5·15	0·160	1	20
4·19	,,	0	2	16·00	0·132	1	—
4	,,	0	2	13·72	0·128	0	92·8
3	,,	0	1	22·29	0·096	0	69·6
2	,,	0	1	6·86	0·065	0	46·4
1·55	,,	0	1	0·00	0.050	0	36

1 Gram = 100 Centigrams.

		Oz.	dwts.	grs.	Decimal oz.	Solotnik.	Doli.
100	Centigr.	0	0	15·43	0·032	0	23·2
90	,,	0	0	13·87	0·029	0	20·7
80	,,	0	0	12·33	0·025	0	18·4
70	,,	0	0	10·79	0·022	0	16·1
60	,,	0	0	9·25	0·019	0	13·8
50	,,	0	0	7·72	0·016	0	11·5
40	,,	0	0	6·17	0·013	0	9·2
30	,,	0	0	4·62	0·009	0	6·9
20	,,	0	0	3·08	0 006	0	4·6

1 Decigram = 10 Centigrams.

		Oz.	dwts.	grs.	Decimal oz.	Solotnik.	Doli.
10	Centigr.	0	0	1·54	0·003	0	2·3
9	,,	0	0	1·40	0·0027	0	1·8
8	,,	0	0	1·24	0·0024	0	1·6
7	,,	0	0	1·08	0·0021	0	1·4
6·5	,,	0	0	1·00	0·0020	0	1·3
6	,,	0	0	0·92	0·0018	0	1·2
5	,,	0	0	0·76	0·0015	0	1·1
4·4	,,	0	0	0·67	0·0014	0	1
4	,,	0	0	0·60	0·0012	0	0·8
3	,,	0	0	0·45	0·0009	0	0·6
2	,,	0	0	0·30	0·0006	0	0·4

1 Centigram = 10 Milligrams.

		Oz.	dwts.	grs.	Decimal oz.	Solotnik.	Doli.
10	Milligr.	0	0	0·15	0·0003	0	0·2
9	,,	0	0	0·13	0·00027	0	0·18
8	,,	0	0	0·12	0·00024	0	0·16
7	,,	0	0	0·10	0·00021	0	0·14
6	,,	0	0	0·091	0·00018	0	0·12
5	,,	0	0	0·075	0·00015	0	0·10
4	,,	0	0	0·062	0·00012	0	0·08
3	,,	0	0	0·046	0·00009	0	0·06
2	,,	0	0	0·030	0·00006	0	0·04
1	,,	0	0	0·015	0·00003	0	0·02

(*To be Continued.*)

Colouring Jewellery by Galvanism.—Mons. Weil has exhibited to the French Academy various articles of jewellery, which were coloured by metallic layers deposited by electro-chemical processes. The colours have a great artistic value and are very durable, resisting friction, moisture, sulphuretted hydrogen, vapours of ordinary burning gas, and the action of light. Edmond Becquerel recalled the experiments of his father, in colouring metals by means of thin layers of oxide of lead and oxide of iron. He obtained very brilliant shades of various colours, and he found that by increasing the thickness of the layers, he could effectually protect metals from rust.—*Comptes Rendus.*

How to Finish a Full-Plate Fusee Watch.

Continued from page 25.

THE wheels, or to speak more correctly, the pinions, must now be pivoted. In the olden time a learner worked on full-plate work as a preliminary to something better, and was therefore encouraged to pay much more attention to fancy details, such as depth and shape of hollows and arbors, than anyone working for a living could possibly do. Apprentices' work, through being kept too long in hand, is apt to look "smudgy"; the happy medium lies between this and "scamping."

Centre wheels are very often polished, in which case they can be touched up at the last moment; but a gilt wheel requires great care in handling. The lower pivot is made before it is gilt, and only requires the colour taken off with a piece of dog wood.

The first thing to do is to clean out the pinions, which are generally straw-coloured through the heat of gilding; this is done with dry "bass" and box-wood. Then the centre pinion should be turned level with the great wheel; and we would here mention that sometimes the steel wheel of the fusee is left too large by the movement maker, and this should be tested by bringing the teeth between the spaces of the great wheel teeth. If they show through they will be dangerously close to the centre pinion, and must be topped and re-cut; this is an insidious, but by no means unfrequent, fault in a fusee watch, and to attempt to avoid it by running the depth shallow, creates a worse evil.

It is usual to finish off the centre wheel first, then to get the third and fourth down to their proper positions and shorten their arbors, so as to get something firm to work on.

The face of the third pinion should be the least shade above the centre wheel. Pinion heads unnecessarily long are considered unworkmanlike, although it sometimes happens that the arbors are undercut by the movement maker, and must be left very much as they are.

The lower third pivot should be left the largest, and the shoulder kept close to the rivet, so as to get a good hole in the bar, there being a great deal of wear in this hole, which really ought to be jewelled, were expense no object. It is, perhaps, hardly necessary to say that the heights should be correctly taken, as stilts or sinks look very unworkmanlike. Competent jewellers always hesitate to recommend a finisher who is constantly asking to have "this wheel raised," or another "kept down." The holes that are rubbed in ought to be flush with the bar or plate, and this saves much trouble in the event of future breakages. In an ordinary full-plate watch the foregoing remarks would only apply to the lower fourth hole; the part of the pivot which acts in the hole should be straight, and the other part tapered, to suit hole in the pipe of seconds hand.

There are two methods of polishing pivots, one being on a "bed," that is, a long notch on the top of the centre, and the other by placing the end of the pivot in a partly broken out dot on the edge of the centre, and pressing on the pivot itself while polishing. Supposing the centres are perfectly adjusted, the first is the safer; but a quick, trained workman would choose the latter. A pivot should be so turned as only to require the graver marks taken out by the polisher; too much "rubbing" is sure to result in a "rucky" shoulder, and most probably, a "lump" in the corner.

The wheels, being pivoted, are then "run." Stop up the calliper holes in bar and plates, and put the fourth wheel and escape pinion in the depth tool. It is very desirable to see if the size of the latter is correct before commencing to work on the fourth wheel, as unfortunate mis-matchings sometimes take place in the course of manufacturing; but this also applies to every other part of the work. The screw of the depth tool is kept to the right, and the fourth wheel is put in on the same side. If the tool is known to mark deep, it is set correspondingly shallow, or *vice versâ*; the habit of holding it exactly upright to mark should be rigorously cultivated. This reminds us of the fundamental rule in musketry instruction, viz., that the sights are to be kept perfectly upright, and not to incline either to the right or the left. In marking, the tool is reversed so that the screw is on the opposite side to the thumb and fingers. The lower 'scape end piece is taken out and the score marked on the bar. The cross depth is made through the dial hole, and here finishers often ignorantly create a great deal of mischief; it frequently happens that the dial is loose on the frame, and before marking the seconds hole, it should be adjusted to the best advantage; the truth of the seconds piece itself can easily be ascertained with a pair of dividers. If the case is at hand, the frame ought to be put in it with the dial on; it is these apparently unimportant points which make all the difference between good and inferior work.

After the hole is drilled in the bar, the top hole is put in with the aid of the maudrill, although impecunious workmen, temporarily deprived of that useful tool, resort to ingenious contrivances during its absence. One way is to put a stopping in the top-plate, which can be turned round; then gently press on the end of pivot, so as to make a mark; drill the hole through and turn it round until the wheel is upright, rivet stopping, and open the hole straight; everything depends upon the skill with which the rivetting is done, or the hole may be forced upon one side. Perhaps the depth is found to be incorrect, and here it is that the knowledge of the size of the escape pinion will be found valuable. If it is on the small side and the depth is deep, the wheel may be topped with advantage, but not otherwise. A depth may be altered by driving a stopping at the side of the hole and opening it out again.

The depths being finally run, it is usual to do the stud work. If the movement is capped and has a compensation balance, there is generally very little room to spare. The top of the balance cock should not be less than fourteen douziemes above the plate, in a fourteen size watch. In planting the stud, the nose should be opposite the cock jewel hole. It is important that it is thoroughly free of the balance arm before drilling the hole, also that the neck will allow the balance screws to be drawn out if required. Above all, have it square, both in the sides and neck; the stud and index are the show pieces in the watch. It ought to screw down steadily in one position; stud screws have often been broken in shifting the stud after it has been screwed down, and this means taking the watch to pieces, if nothing worse happens. A spring should be pinned in, half the size of balance, and the hole so drilled that it leads properly into it, the curb pins being made to correspond. Care should be taken not to drill the hole too large, otherwise the spring will not pin in flat to any certainty, and continual bending is bad. The annoyance arising from springs coming out of the curb pins may often be traced to this cause, but the risk of this can be diminished by keeping the index towards "slow," as there is then not so much distance between the curb pins and the stud. Long pins are not always the safest, because if a spring once jumps out it cannot get back again. The index ought to be free of the balance when pressed down on the silver piece, otherwise a wearer might inadvertently stop the watch while moving it, or the cap might press it down too close.

When this is done, the work may all be taken off the plates, and whatever jewelling done that is required; then follows the engraving and stoning up for gilding. A round cork from a wired bottle is the most convenient to stone on, and it should be kept away from grease or filings. A round piece of brass with a perfectly square bottom, used underhanded with oil-stone dust, is best to use for the sinks. Care should be taken not to rub up against the bottoms of the pillars with the stone; in fact, the smart appearance of the watch depends upon the pillars being preserved in a perfect condition. The plates should always be finished off with the same stone, in order to ensure their gilding the same colour and surface. Polishing up and putting together will be dealt with in the next paper.

(To be Continued.)

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Mica, Pyrites of Iron and Copper:

Their Nature, Uses, and Delusions of Gold and Silver.

By H. Bush, Hull.

As every substance has its shadow, everything genuine an imitation, it is to be expected that the precious metals, in their native state, should have their counterfeits, natural or artificial. Leaving aside the latter class, from time immemorial have men been deceived by those of the former, mica, pyrites of iron and copper, in mistaking them for gold or silver.

What assayer, mining engineer, mineralogist, metallurgist, chemist or jeweller, has not had experience in any of the gold or silver-looking substances, to the somewhat disappointment of the finder or parties offering them for sale or examination? A few brief hints, to dispel any doubt of their being genuine metals, may be of advantage to some of the readers and many members of the trades whose interests this journal represents.

Mica is not the mineral that has done much harm or caused great disappointment. It is found in the bed of many streams intermixed with the sand, and as it is of glittering appearance, resembles the genuine gold dust found in several rivers; but separated from the sand, it will at once be found of such a low specific gravity, as to convince the finder that it is not a metallic substance. The component parts of mica are granite, gneiss, mica-slate, silica, and alumina, in more or less proportions, and is found in many primitive rocks, and usually occurs in thin plates, semi-transparent and of peculiar lustre.

These laminæ are sometimes many square inches in extent, but they are occasionally mere spangles, scarcely discoverable by the naked eye, except by their lustre. The scales are sometimes parallel, sometimes interwoven, sometimes wavy or undulated, and sometimes representing filaments. The colour varies from silver-white to black, with all the intermediate changes. The large sheets of mica, used instead of glass in stoves, lanterns, &c., are brought from Siberia, where this mineral serves all the purposes of glass in windows; and is also for this purpose used in Russian ships of war, being less liable to be broken by the concussion of air during the discharge of heavy artillery. Mica subdivides into ten species, viz., mica, pinite, lepidolite, chlorite, green earth, talc, nacrite, pot-stone, steatite, and figure stone. There is also a micaceous iron ore, occurring generally in amorphous masses, and composed of thin six-sided laminæ; colour iron-black or steel-grey, opaque, with a metallic lustre and greasy feel. It yields nearly seventy per cent. of iron. The specific gravity of this ore varies from 4·5 to 5·7.

Pyrites, or fire-stone, is a name given to the native sulphide of iron, because it emits sparks of fire when struck against steel, and used to be the predecessor of matches for striking light or kindling fire, and because, when heated over the fire, the sulphur which it contains burns with a bluish flame. The term is now used to designate the native sulphides—*the ferruginous*, the bi-sulphide of iron, and *the cupreous*, the one of copper, and they have general similarity in external appearance, and are, in fact, rarely free from either, the pyrites of iron containing some copper, and those of copper containing some iron. The colour varies from yellowish-white to golden-yellow and deep bronze, with a high degree of metallic lustre. The specific gravity varies from 4·8 to 5·1, and contains about two parts of iron to one of sulphur. Iron pyrites occur in cubical crystals in veins, and in various slate rocks, &c., or in globular concretions imbedded in indurated clay, chalk, &c. It also accompanies the ores of other metals, and extends from the oldest rocks up to recent deposits. It usually occurs crystallised, but also in irregular masses and imitative forms; representing, in many instances, remains of both animal and vegetable origin.

The crystals from the island of Elba are extremely large and beautiful, and are often from three to four inches in diameter. Good specimens are also found in Cornwall in England, and in Sweden. Besides occurring in all districts which produce other metallic minerals, it is abundantly found in many coal regions, where, by its oxidation and conversion into ferrous sulphate, it sometimes produces sufficient heat to cause spontaneous ignition of the coal with which it is associated.

Iron pyrites are never directly treated for the sake of the iron they contain, but are frequently employed as a source of sulphur in the alum or sulphuric acid manufactories. The cupreous iron pyrites, after being burned for the manufacture of sulphuric acid, are treated for copper by a wet process of extraction. Cupreous iron pyrites come in large quantities from Spain and Portugal, and also from Norway.

Copper pyrites differ in so far from iron pyrites in appearance, by having more metallic lustre and deep brass-yellow colour. The specific gravity varies from 4·1 to 4·3, and is somewhat less than that of iron pyrites; and when strongly heated on charcoal before the blowpipe, it readily fuses into a dull-black globule, which, when containing iron, speedily becomes magnetic. When remelted with a little carbonate of soda, it yields a button of metallic copper; if dissolved in nitric acid, it assumes a fine blue colour by the addition of ammonia.

The mineral is found in loads or veins, which usually occur in granite or in clay-slate, and is most commonly associated with iron pyrites, together with carbonate and other copper ores.

The principal localities in which these ores are found are Devonshire and Cornwall in England, also in Saxony and its neighbouring locality in Prussia, in Hungary, in Sweden, Ural Mountains in Russia, also in France, the United States and South America, China, Japan, and South Australia.

Iron pyrites, as well as copper pyrites, occasionally contain gold and silver, but these are seldom present in sufficient proportion to allow of their being profitably extracted.

Iron pyrites differ from copper pyrites by being too hard to be cut with a knife, whilst copper pyrites crumble when attempted to be cut.

When found by inexperienced parties, they are generally *not* supposed to contain gold; but that they *are* gold, and being a very widely distributed metalliferous mineral, it is very frequently found in rocks of every age, in almost all parts of the globe. The test of the pyrites for gold or silver is, first of all, by the attempt to cut (if large enough to handle) with a knife, then placing some of the suspected mineral, powdered, in a common iron spoon, over a fire; if, when well heated, sulphurous fumes arise, it is then evident they are pyrites, by the sulphur leaving the iron or copper. If it cuts easily, somewhat like lead, and flattens by the use of an anvil and hammer, it may probably be of what it is thought or *wished* to be, and is, at all events, worth investigating. A guide for a practical, and at the same time simple, test may be found in a previous communication, entitled: "Analysis of Native Alloys, containing Gold, Silver, and Platinum," in No. 86, the July number of the year 1882, page 5.

Historical Notes of Voltaire, as Watchmaker.

(*Continued from page* 21).

With great expectation from this new patron, and delighted with the disposition of the Count of Ossim, he again wrote to him on August 24th, 1770:—

> "Your Excellency will pardon me for troubling you once more with my expressions of gratitude. Your efforts in the interest of our rising Colony show the nobility of your heart, and also proves that in you the King of France is worthily represented.
>
> "I congratulate myself for being remembered with the same exceptional kindness by the Duke and Duchess of Choiseul as it has pleased you to honour me with; my heart is too full to be silent, therefore kindly accept my expressions with indulgence."

On the 26th November, 1770, and on March 6th, 1771, Voltaire wrote again to this Ambassador:—

> "Your Excellency has sent prosperity to my little Colony. I am pleased to think that it exists by your favours, since it has lost its patron, the Duke of Choiseul."

Voltaire did not confine, however, his exertions to the cultivation of the favours of the French Ambassadors; he wrote to everybody to whom he could assign the least reason or his communication; in fact, he knocked at every door.

In one of his applications to the Duchess of Choiseul, on the 9th of April, 1770, he observed:—

> "I have smuggled a petition to the King in my packet."

In this character of petitioner he displayed as much perseverance as enthusiasm, and knew how to exhaust the favours of his friends.

The great Catharine of Russia responded in a royal manner to his solicitations, by sending an order to the value of twenty thousand thalers, and a letter in the style of Lady Sévigné, with which Voltaire was greatly elated, and observed:—

> "A great ruler like Catharine did not forget to pay, notwithstanding the approaching war with Turkey."

As regards Frederick the Great, that Potentate was too shrewd to throw away his money. Voltaire was well acquainted with him, and therefore not surprised at not receiving any reply. Frederick, however, with the object of obtaining some advantage from the disputes among the watchmakers of Geneva, solicited Voltaire at a later date to send him fifteen of the expelled families, but it is not known if this followed.

Though no practical result followed Voltaire's application to the Emperor of China, it was mainly due to the difficulties of communication; otherwise he was very favourably remembered. On December 16th, 1771, he observed to the Minister Richelieu:—

> "I have established considerable commercial transactions between St. Petersburg and my Colony, and am only waiting for a reply to extend it also to the King. This appears visionary, but it is true, nevertheless."

Those who maintained the most frequent correspondence with him were perpetually bombarded by his petitions. Voltaire's friendship was continually in danger of rupture, because he made incessant use of his friends. He flattered them in every possible way, but he required much of them, and too aptly sought to employ them as commercial travellers for the house of Voltaire & Co.

His friends, "von Argenthal," stood foremost in the demand, which was a condition of the friendship of the poet and watchmaker. Without neglecting their influence at the "Comedie-Française," which was in their department, they kept a stock of watches and sold them to their acquaintances. Numbers of Voltaire's letters show the service which they rendered to the Colony, and which was demanded from their wonderful kindness. The following are a few quotations. December 7th, 1770, to the Countess of Argenthal:—

> "I have now ordered a case with a figure of Venus. It will be surrounded with a wreath of precious stones, the hands will be set with diamonds, and have a chain of coloured gold, all of the best and finest workmanship."

October 15th, to Count Argenthal:—

> "I congratulate the Duke of Praslin for his successful pacification of Tunis. Since in that part French watches are preferred, by reason of their cheapness in comparison with the English, the factory of Ferney is at the service of the Duke of Praslin."

July 17th, 1771, to the Countess:—

> "The Colony will send at once the two required watches."

October, 1771, to the Count:—

> "I could only send you five watches. . . . ."

The Count endeavoured to shake off some of the work imposed on him by engaging the house of Lejeune as agents for the factory of Voltaire & Co. for Paris. According to the views of Voltaire, this was of advantage to the firm. He wrote to Argenthal, on the occasion of a consignment and transmittance of account:—

> "Lady Lejeune can sell the watches at what price she pleases, the surplus is hers. Valentine will deliver her the watches at cost price."

The Countess of St. Julien, well known for her bold exploits in the hunting field, was the more inclined to the undertaking by reason of the fact that she was already interested in the district of Gez, in which Ferney was situated, and for its inhabitants.

The Minister Richelieu never bought from Ferney, either for himself or his mistresses, but still he rendered them service at every opportunity.

On the occasion of the wedding of the Count of Artois, later King Charles X., Voltaire, who was ever on the alert for an opportunity, introduced the matter of the watch industry to the Minister, who referred him to Madame Du Barry.

It appears the custom of those days, for a mistress of the King to make presents on the occasion of a marriage in the Royal Family. Voltaire was too much a creature of the times to be offended at this; the quality of the purchaser gave him no thought whatever; it was totally indifferent to him whether he sold to Catharine of Russia, the Sultan, the Pope, or Madame Du Barry. As a rule, dealers do seldom otherwise.

Voltaire sent watches to Madame Du Barry, and wrote as follows:—

> "I take the liberty to send you a specimen of the work made by the Colony founded on my estate. The watch is richly ornamented with diamonds, and what will still more surprise you, Messrs. Dufour and Ceret, who have finished the watch under my own eyes, only ask one thousand francs for it. . . . . This watch, which I have the honour to submit to you, is, unfortunately, without repeating work; but should you require a repeating watch, or some other costly additional mechanism, you will find that you can obtain it here at one-third less than in Paris."

If the court of Louis XV. was liberal in its gifts, it was with considerable difficulty that it paid its accounts; for a year after the delivery of this watch, the watch factory of Ferney still waited for payment. A similar event had already come to pass. On the occasion of the marriage of the Duke of Provence, two watches were obtained from Ferney, for which Voltaire could only obtain payment by the aid of his friend the Minister Richelieu.

There was now a new cause for the exertions of Voltaire, and he never rested until he was in possession of the forty Louis d'or. It is interesting to notice with what pertinacity

Voltaire pursued his object. On August 15th, 1779, he introduced the matter thus:—

"The artists of my Colony, which sent you at your desire a watch ornamented with diamonds, on the occasion of the marriage of the Duke of Artois, fall at your feet, &c. . . . ."

In a communication to the Minister on August 20th he added a P.S.:—

"When you arrange your affairs, I beg of you kindly to think of my poor Colonists."

On October the 14th follows a letter overflowing with gratitude, so that in the onset one would think that Voltaire had gained his object. This, however, was not the case; he only sought to obtain a definite promise from the Minister.

The further development of this matter is shown in the letter of the 17th of October:—

"It has been offered to return the watch to the makers. This, however, would land them in new difficulties, as it affects the very poorest of those which I have given shelter at Ferney."

On October the 30th he wrote again:—

"I beseech you kindly at your leisure to let me know your pleasure in this affair, as the decision is fully in your hands, and not in the hand of the Minister of foreign affairs."

Voltaire pursued his object with an untiring effort; this is not the only example of his zeal in recovering long standing accounts. The firm of Servaud and Boursault had entrusted watches and precious stones to the Court of Morocco, through the agency of a nobleman of Genoa, named Vial, who was made bankrupt. Voltaire took up the matter with great prudence; his correspondence shows what ways he took to obtain his object.

More interesting still does Voltaire appear in the character of a commercial traveller, as regards the manner in which he secured his customers. He used every opportunity to obtain purchasers, and found continually means to push his articles.

In a letter to the Spanish Minister d'Aranda, of December 20th, 1771, the following passage occurs:—

"If you wish to decorate the finger of a noted Spanish Lady with a watch which is fixed in a ring, having a repeating work and a seconds hand, and richly ornamented with precious stones, you will find such an article only in my village, where they are ready to do your bidding. I do not say this in vain boast, because I became accidentally acquainted with the artist who is able to do such a thing. Such work of art cannot remain unnoticed by you."

In a letter addressed to the Duke of Rochefort, July 23rd, 1770, he concludes as follows:—

"We make splendid watches. Paris obtains its watches from Geneva, and we furnish at fully one-third cheaper than you can buy in Paris. If you wish some for your friends, then please apply to your faithful servant."

To the Marquis of Thibonville he wrote as follows:—

"I beg first to offer you some explanation about your watch, about the price of which I have been under some mistake; it is eighteen Louis d'or. For this sum it is excellently finished, it has a repeating work, and is ornamented with diamonds. It is true the latter are of second quality, but they have a fine lustre, and above all the watch has a splendid rate. Apart from this, please to notice that you need not pay for it before March."

In a letter to the Minister Richelieu, of October 17th, 1774, he says:—

"It is remarkable that nearly all the workmen whom I have established work for Paris watchmakers, and without hesitation inscribe their names on the watches which we make for them."

Voltaire met occasionally with people who wanted the best for a mere nothing, and would readily see the advantage of his offer. Thus, the Marquis of Thibonville asked for a repeating watch at five Louis d'or. The Philosopher replied:—

"It is as impossible to get a repeating watch for five Louis d'or, as a horse for four sous in Paris."

The Chevalier de Lisle was scarce less modest in his demands, to whom Voltaire replied in like manner:—

"How can you conceive that you can buy a repeating watch, set with diamonds, for eighteen Louis d'or? In which volume of the 'Arabian Nights' have you read such an anecdote? But for eighteen Louis d'or you can obtain a repeating watch set with 'Markassits stones,' which look as well as diamonds. The same sort of watch would cost you forty Louis d'or in Paris. Please favour me with your instructions; you will be served with first-class watches or very bad verses—just as you please."

Thus, with fine "tact" he managed his customers without offending them, preparing the way for future transactions.

Remarkable is it, that he gave advice like one versed in all the intricacies of the trade, as is evident from the following letter to Count Rochefort:—

"I am glad that you are satisfied with my watch. I am only afraid that it is not sufficiently timed, as that requires a longer period. The object is to move the index as it may be necessary. Sometimes the balance spring itself has to be changed in its position, which is a very delicate operation. Every art has its secrets. As regards the price, Messrs. Dufour and Ceret inform me that it amounts to 650 livres, which appears to me very cheap. You can pay these people as you please; with your permission they will forward a bill for your acceptance."

Apart from his endeavours to find customers for his agents, to dispose of their stock and secure their payment, he did not forget to concern himself about the manufacture of a cheaper, though sound article. He took wonderful trouble to ensure the support of the postal officials. They were favourable to him while under the control of the Duke of Choiseul, but in the following year the superintendence passed into the hands of the Duke of Aiguillon; without, however, any curtailing of the privilege accorded him by his predecessor. It is apparent from his respective correspondence, what importance he attached to the regular delivery of his watches. Voltaire watched over them as if he had nothing else to do; nothing escaped his notice.

Thanks to such protection, the watch industry of Ferney developed itself rapidly; the sum of their yearly production rose to 500,000 francs. Several firms were established, such as Dufour & Ceret, Valentine & Co., Servaud & Bousault, Daleizette, Paulier, and last, the noted Lepine.

Lepine, the court watchmaker, was formerly in Challez, in Gez, a watchmakers' village, where J. J. Rousseau had learnt his trade. Therefore, with him it was an act of patriotism to be a patron of that Colony.

But there was a hollowness about the prosperity, which rose in connection with this place within a period of two years. It was a house built on sand; it rested on the fame of Voltaire, the power of his influence, the large circle of his acquaintances, and on his untiring exertions; and was, therefore, in danger of destruction with the departure of Voltaire. He himself anticipated the future fate of his establishment. The Colony, despoiled of its guiding spirit, began to sink rapidly. Nevertheless, it might have sustained itself for many years, through the connections which Voltaire had established, if it had received the support of the Ministry, if the watchmakers of Ferney had been exempted from conscriptions, and their productions had not been treated as foreign goods, and customs levied on them.

The Geneva watchmakers, who perceived this result, left Ferney and returned home, where the reception accorded them by their fellow citizens left little cause for complaint.

Though the work of Voltaire is now lost, and time has, without any regard, obliterated every vestige of his establishment, it is, nevertheless, worthy of notice, that the philosopher shrunk from no effort in the interest of his Colony, for which he gave freely his time and money. No wonder, therefore, that to-day Voltaire is remembered at Ferney with honour and gratitude.—*Allgemeine Journal der Uhrmacherkunst.*

Lecomber v. Hollins.

THE recent trial at the Warwickshire Summer Assizes, relative to the alleged infringement of a trade mark upon watches, is of a most important character; so important as to justify a permanent record in these pages. The information will be useful, not only throughout the United Kingdom, but, indeed, wherever the Queen's Writ runneth. Being aware of the numerous pitfalls that lie in the paths of the adventurous improvers in the various trades and affiliated branches represented by this journal, the proprietor has instructed me to give a connected narrative of the whole matter, to be followed by such legal information as may serve to throw some light and guidance upon what has gone before. That instruction I will endeavour to carry out to the best of my experience and ability.

The case of Lecomber *v.* Hollins will be long remembered; not only for its own sake, but on account of the criminal law having been invoked, instead of a civil action, to punish by fine or imprisonment, or probably both, for an offence in the infringement of an alleged trade mark.

Mr. John Lecomber, wholesale watch manufacturer, of No. 12, Mount Pleasant, Liverpool, charged before the city magistrates at Coventry, on June the 27th, Mr. Edwin John Hollins, watch manufacturer of the last-named place, for an infringement of a trade mark. As may be supposed, the greatest local interest was taken in the proceedings. The charge alleged that Mr. Hollins, the defendant, "did at Coventry, on the 14th day of April, 1883, with intent to defraud, procure to be applied a certain forged trade mark, to wit, the words 'decimal chronograph,' to an article, to wit, a watch, not being of the manufacture and workmanship denoted by such forged trade-mark, contrary to the statute." A second information varied the charge by leaving out the word "forged" [forged trade mark], and concluded with the words "not being of the particular description of manufacture and workmanship denoted by such trade mark."

Mr. Cobbett, of Manchester, stated the case for the prosecution, from which it appeared that the *gravamen* of the charge rested upon the fact that the defendant, Mr. Hollins, had painted upon the dials of some watches sold by him the words "decimal chronograph," which words the prosecutor claimed as his property in the form of a trade mark. The information was laid under the 2nd section of the Merchandise Marks Act (1862) which defined the offence of infringement as a "misdeamour," and under the 14th section of the same Act, the punishment for any person convicted of the offence was fine or imprisonment, or fine and imprisonment, and the forfeiture of the articles marked. About 1875, Mr. Lecomber was stated to have invented an improvement in watches which had been very profitable to him. Until the year named the seconds hand made only nine beats in two seconds, thereby breaking this marking into fractional parts. He set to work to improve this, and produced five beats to the second, or ten to the two seconds, and registered the improvement under the title of "Decimal Chronograph, September 13th, 1875, Registered." Circulars to this effect were sent to the members of the trade in Coventry, apprising them of the fact indicated. A watch was produced in court, and also the Certificate of Registration. After the passing of the Trade Marks Act of 1875, he registered the design and mechanism again, and produced the certificate in court. The protection of the first registration lasted for only three years, but after its expiration he continued to use the words on the dial as before, and his right to them had never been questioned by any other watchmaker.

In consequence of what he had heard he went to Manchester, and there purchased at a shop in Market-street, kept by a Mrs. Samuels, a watch having on the dial the following words:—"Patent Decimal Chronograph, H. Samuels, 97, Market-street, Manchester." This watch was traced to the workshop of the defendant Hollins. Mrs. Samuels was so satisfied of the prosecutor's statement that she had been infringing his trade mark, that she compromised the matter by paying him £115. He went and informed Hollins that he was prosecuting under the Trade Marks Act, and showed him the watch that had been bought at Mrs. Samuels's shop.

Mr. Dorsett cross-examined the prosecutor, who stated that he had been in partnership with his own wife, Mrs. Lecomber, for about three years. A Mr. Manning, a friend of theirs, bought the watch for him of Mrs. Samuels; it was an inferior one, and the movement had been made by Mr. Preston, of Prescot. He said that he had never seen the word "decimal" on a watch before he registered it. He gave as his reason why he prosecuted the defendant criminally, that it was because he could not afford the expense of a Chancery suit. It appeared from further testimony that the name of Samuels was on the dial as well as the words "Decimal Chronograph;" yet, notwithstanding that, a witness for the prosecution, of the name of Williams, from the town of Bury, Lancashire, swore that such words would not necessarily indicate that Samuels made the watch, nor would it prevent a person from assuming that it was made by Mr. Lecomber. Since 1879 this witness had paid Mr. Lecomber a royalty to use the name "decimal chronograph" on the dials. The witness called them "improved decimal chronographs," and the amount of royalty was half-a-crown a watch. These statements practically closed the case for the prosecution.

Mr. Dorsett addressed the bench for the defendant, Hollins, and contended that from the fact of the name of Samuels being on the dials of these watches, there could not possibly be an intention to commit a fraud. The words "decimal chronograph" were merely of a descriptive character, and could not form the subject of a trade mark. He cited a case under the Trade Marks Registration Act, 1875, in which the learned Master of the Rolls held that the words "Braided Fixed Stars," which were sought to be registered as a trade mark, simply described a commodity, and could not be registered; by a similar parity of reasoning, neither could the words "decimal chronograph" be so registered. Mr. Lecomber had no right to register the words "decimal chronograph," because they merely described the kind of watch that he made, and the kind of article that was well known. In the defendant having used the same words in the same descriptive manner, there was no intention whatever to defraud. That being so, he asked for the case to be dismissed. The decision was that the case must be submitted to a jury.

Evidence for the defence was then called, and William Payne, a watch-dial maker, of Coventry, said that he had been in the trade for fourteen years, and had seen painted upon watches "Patent Chronograph," "Decimal Chronograph," and "Marine Chronograph." They were put on in any form, straight, circular, or "anyhow," according to order. He believed that they had been used in the trade as far back as fifteen or sixteen years ago. Upon cross-examination this witness said that he could swear that he had painted "decimal chronograph" on watch dials before he saw the name on Mr. Lecomber's watches. Joseph Flint, another old watch-dial maker, of Coventry, deposed that ten years ago he had painted "decimal chronograph" upon his dials. Joseph Franklin, an old dial-maker, had made dials for Mr. Lecomber some time since with the words "decimal chronograph" upon them, and had seen such dials when he was an apprentice twenty years ago. As there were eight or ten further witnesses to call, the magistrates committed the defendant for trial at the ensuing Quarter Sessions, under bail of himself and sureties to the extent of £100. There were several other similar cases, but some were adjourned and some withdrawn under conditions not to offend again.

Upon the assembling of the Quarter Sessions court on the 6th of July, the grand jury found a true bill against the defendant, Hollins, for having used a trade mark belonging to the prosecutor, with intent to defraud. Without calling upon Mr. Hollins to surrender, the chairman announced that he had received a writ of *certiorari* to remove the case to the High Court of Justice, and, therefore, the trial could not be proceeded with. It was at the prosecutor's instance that such removal had been procured. Mr. Dorsett, on behalf of the defendant, asked for costs up to the Quarter Sessions day, but after a long legal argument, the chairman of the bench decided not to make an order for want of jurisdiction, as he must assume that it was in the interests of justice that the court above signified for the removal. Afterwards the High Court remitted the trial to the Warwick Assizes.

We now arrive at another stage of the issue. Upon the 3rd of July, a meeting of watch manufacturers was held at Coventry, under the chairmanship of Mr. J. Radges, of Butts, to the number of about fifty, when a series of resolutions were passed to the following effect:—

That those present sympathised with Mr. Hollins regarding the prosecution instituted against him, and the trade generally do hereby resolve to assist him in defraying the necessary expenses for his defence; and that the Birmingham and Coventry manufacturers be solicited, and waited upon for subscriptions. At a subsequent meeting a list of subscribers was handed in.

The third stage in the business was arrived at by the opening of the Warwick Assizes, befor Mr. Justice A. L. Smith, upon the 2nd of August, when Mr. Hollins surrendered to his bail. Much the same evidence was given as that which has been already detailed. Mr. Lecomber was asked why he had had the case removed from the Quarter Sessions, and he answered that he had made an affidavit that he could not obtain a fair trial in Coventry. In further reply to Mr. Harris, the defendant's counsel, the prosecutor said that Mr. Hollins could make a decimal chronograph, but he must not put his, Lecomber's, trade mark upon it.

After the conclusion of the prosecutor's evidence, the learned Judge asked Mr. Young, Lecomber's counsel, if he could carry the case any further? The learned Judge continued: It was admitted that anyone could make a decimal chronograph watch, and that when the defendant was charged with making the watch, he said that he thought that the time had expired for which it was protected; and yet they were going to ask the jury to convict the defendant. There was a name on the watch, and the prosecutor said, himself, that the painting of the name on a dial would lead outsiders, at least, to think that the watch was made by that person. Yet prosecutor wished to say that the defendant intended to defraud. He, the learned judge, did not see that there was any case, but he would hear what Mr. Young (the prosecuting counsel) had to say.

Mr. Young replied that the words "decimal chronograph" was the distinctive mark of Mr. Lecomber's watch, and he should ask the jury to say, that the only object the defendant could have in putting this mark on the watch was to defraud.

The Judge:—"That is, that a person buying a watch, marked decimal chronograph, by H. Samuel, would think that they were buying a Lecomber watch." Mr. Young: "Yes, certainly."

This answer of Mr. Young provoked a legal discussion, in which his lordship said, that the intention to defraud was the essence of the case. Mr. Young rejoined that this was an important case to Mr. Lecomber; but if his lordship ruled against him, of course he must submit.

The Judge: "It is a criminal case, and I am not going to rule; it must be left to the jury." Turning to those gentlemen his lordship said: "Do you see any intention to defraud?" The Foreman: "None at all." The Judge: "Nor anyone else who has heard the case."

Mr. Harris, counsel for the defendant, asked for costs, the case having been removed at the instance of the prosecutor by *certiorari*. Mr. Young stated that they had given a bond for the extra costs incurred by the removal of the case, and the judge told the defendant's counsel that he could have an order for costs, if necessary. And there an end of a promised prolonged trial in a very short time.

Never was there a better illustration of the Horation maxim, *Parturriunt montes ; nascetur ridiculus mus:* "The mountain is in labour, and a ridiculous mouse is brought forth," than the "great" judicial delivery of Lecomber *versus* Hollins. Firstly, there was Hollins hard at work upon the fifth-second recording chronograph, consecrated to the god of fractional time; then there was the prosecuting journey to Manchester, and Mr. Lecomber duly receiving the "conscience money," the £115 from the penitent Mrs. Samuel; that was followed by the stern, minatory visit to the "forgery," at Coventry, and the warning that the criminal law would soon be in breathless gallop. The next scene was the magistrate's court, the long recital of the "criminal's" dark handiwork, and the committal to the terrible Quarter Sessions. After that comes the dread, the really invincible writ of *certiorari*, before whose potency even chairmen and benches of Quarter Sessions must bow. "Ah!" I hear somebody ask, "What *is* a writ of *certiorari*?"

My good friend, there was once a conversation in court before the celebrated Lord Mansfield, of whom it was jocularly said:—

> "Persuasion tips his tongue whene'er he talks,
> And he has Chambers in the King's Bench Walks."

But "Willie Murray," as his "chums" lovingly called him, was anything but a joker, himself. The subject under discussion at the time alluded to was, that everybody should have a little, however little, knowledge of the *principles* of Law. The text upon which the "preaching" was founded being:— *Ignorantia juris quod quisque tenetur scire neminem excusat.* In other words: "Ignorance of a law which every man is bound to know is no excuse." The great jurisconsult closed the "palaver" by an expression which has become historical: "I wish that every man knew just enough of the law to be able to keep out of it."

Certiorari in law is, "to be made more certain," and is a writ issuing from one of the superior courts to the officers of an inferior court, directing them to transmit, or cause to be certified (*certiorari facias*) records or other proceedings. The object of the removal is either that the judgment of the inferior jurisdiction may be reviewed by the superior court, or that the decision and proceedings leading to it may take place before the higher tribunal.

For instance, where the convictions of magistrates, or the judgments, or orders of Courts of Quarter Sessions, are removed by *certiorari* into the Queen's Bench Division of the High Court of Justice, by way of Appeal against their validity, in which case the decision which has previously been given is re-considered, and is either confirmed or "quashed"; that is, set aside. By this writ, indictments, with the proceedings upon them, may, at any time before the actual trial, be removed from the assizes, or quarter-sessions, into the court above—to wit, the Queen's Bench, as the supreme court of ordinary criminal jurisdiction. For such purposes the superior court may dispose of the matter as it thinks proper; that is, it may try the case itself, or return it to the assizes, or quarter-sessions, if that course should seem good to it. A writ of *certiorari* can be claimed by a prosecutor *as a matter of right*; but when applied for by a defendant, it is a matter of discretion, and is generally refused, unless under very peculiar circumstances. There is another point that must be mentioned; that is, to prevent the occurrence of frivolous appeals, it is usual to restrict the right to a *certiorari*. Curiously enough, the instrument itself is a small strip of material made from the skin of an innocent lamb, whilst the seal was once beside the honey of the intelligent and industrious bee! And now, kind reader, have I told you what are the powers and functions of a writ of *certiorari*.

Well, the omnipotent parchment having issued from the equally omnipotent court by where once stood Temple Bar, London, it staid the hand of Quarter Sessions in Coventry; through there and to Warwick it marched, and everybody concerned had to march after it. What it did there, I have already told; and all who were interested were not long in learning that "decimal chronograph" on a watch dial is no trade mark at all, be it ever so deeply registered in the blackest of black ink. It is quite reasonable to assume that Mr. Lecomber took his way to his pleasant mount at Liverpool, a sadder and a wiser man; whilst Mr. Hollins glided off to the famous city of the three tall spires, quite prepared to hear their bells boom forth, "See the Conquering Hero Comes."

I have been in Coventry, and when trade is good there, milk and honey are plentiful. I have tasted both, and "full many a time and oft" have I smoked the pipe of peace—and comfort as well—in the commodious room of the *Craven*, and have listened to Mr. Claridge and his friends and the jocular adventures of the day. I hope to do so again.

In the next number I will give an epitome of the law relating to trade marks, which may be serviceable to some one at some time or another—if only to keep them from wading more than waistband deep into the ocean of the "glorious uncertainty."

C. Stuart Murray.

Tax on Manufactured Silver.

TO THE EDITOR OF THE "WATCHMAKER, JEWELLER, AND SILVERSMITH."

Sir,—The duty of one-and-sixpence an ounce on manufactured silver enjoys the distinction of being allowed to remain on the statute-book, in defiance of the fact that it is admittedly open to every objection that a tax can possibly have made to it, and that no conceivable argument can be urged in its favour. The sum of its contribution to the Revenue is a contemptible one, and it bears with crushing weight on a branch of industry in which, relieved of such incubus, an important trade would stand happily wedded to a beautiful art, both of them receiving a much needed impetus towards prosperity.

It is a delightful thing for our beloved country that it happens to be ruled by statesmen so eminent and able, content to spend laborious days and sleepless nights in its service. One is bound to suppose that they rule it to perfection, seeing that they are left with so much spare time on hand to shed their sway over many distant peoples, some of whom have not that we know of had the good taste to ask, or even the grace to be thankful, for that blessing. This is the way they deal with the question under review: we quote from Mr. Childers, in his place in Parliament, in reply to a question put to him on 10th May last:—

> "I have already stated that I have no intention to propose to repeal the duty, and I may say, that until some understanding is arrived at as to what would be a reasonable drawback, it would be useless to endeavour to ascertain its amount. The claim of the majority of the trade is for the return of all the duty paid on unused plate without limit of time, if the duty should be repealed."

So that this tax is to remain one of the facts of the universe, until those who have stocks of unused plate on hand happen to meet together and unanimously agree to go and tell Mr Childers that they don't want any drawback!

Within the last five-and-twenty years the duty on tea has been reduced from a rate which practically excluded it from the working-man's table to one which has happily made it the necessity of the poorest. Within the last decade the duty on sugar has been altogether abolished. May we ask, in a frame of wondering suspense for the reply, where is the distinction between the present holders of unused silver plate, supposing the duty to be repealed, and the then holders of undrunk tea and unconsumed sugar? And we wonder how it would have fared with a finance minister who should have ventured to stand with his miserable little mop against the advancing tide with a reply like this:—

> "I may say that, until some understanding is arrived at as to what would be a reasonable drawback on tea and sugar, the duty will remain as it is, and you may as well govern yourselves accordingly."

We are not, of course, referring to the present happy time in which "I likes to be despised" is Mr. Bull's motto, and supremacy in prevarication the passport to his most cherished honours. At the not very remote period referred to, the uplifted toe of that gentleman's boot would have indicated the point in the horizon towards which *that* particular Chancellor had best have betaken himself.

In the constantly increasing glut of raw silver, and its direful effect upon the Indian Exchanges, and by direct consequence upon the welfare of India in its every ramification, political, commercial, and social, and by not remote consequence on that of England, there is constituted a question which is the despair alike of the statesman and the economist. One little possibility remained to the former, that of leaving the trade demand for this metal to the natural play of the market, in the hope that a largely augmented consumption would at all events partially counteract the every-growing supply. But, no! in the counsels of foolishness it has been otherwise ordered. Our masters, whom by a peculiar irony we term our servants, have nailed their colours to the mast:—"Eighteen pence an ounce and no surrender." In our belief, the demand for silver for trade purposes, now artificially checked by this wretched duty, would, under opposite conditions, develop itself to a surprising and unexpected extent, and do much to relieve a strain, the tension of which is within measurable distance of the danger point.

Again, the demand for manufactured silver on the part of our own colonies, as well as that of many trans-oceanic states, is a large and increasing one. And it is a demonstrable fact that this trade, of which England is the natural domicile, is largely influenced to the American market by the operation of the English duty. Theoretically, of course, the return of the duty under the term "drawback" on export, is supposed to compensate the effect of its payment in the first instance. But this plausible kind of comfort is in practice neutralised by the incidents of the operation. Say that perhaps a Birmingham or Sheffield silversmith has on hand a foreign or colonial order for some fine piece of composite work in which silver is the chief material, but in which glass, porcelain, ebony, or ivory constitute a part. It is completed, beautifully packed, and sent to the docks for shipment—and then what happens? In London, it most probably would go to the Royal Albert Dock, about ten miles down the river. The Custom's officer would there open the whole thing out again, and as nothing but the naked silver can be placed in the scales to be weighed for drawback, every bit of separate material would have to be unscrewed and detached from it so as to permit this to be done. Anyone can estimate the contrast between the original packing and the re-packing by dock workmen, in the course of which not improbably the clear burnished surface which left the midland town may now and again receive the fine artistic impress of a perspiring thumb. Who that has a rival *duty free* market to fall back upon, such as exists in the United States, would be likely to submit to this process a second time?

In our belief, any argument for the retention of the duty, based on the supposed reluctance of the master silversmiths to relinquish the drawback on their existing stocks, involves an undeserved reflection on their intelligence. As a matter of simple choice, they would of course prefer to have the two things—the drawback *and* the abolition of the tax. But is it conceivable that they would stand seriously in the way of the latter measure taken by itself—a measure which would mean a new lease of prosperity to them—merely because they cannot have the "moon" which an imaginative finance minister supposes them to be "crying for"? And even if the masters were as foolish and short-sighted as Mr. Childers takes them to be, and as we do not believe them to be, what of the men?

There is unhappily under present conditions no machinery within the constitution for the case of those who have wrongs to redress, but who are too self-respecting to appeal to the methods of vulgar agitation. If you only make noise enough, and do it with a complete absence of decency or scruple, your cause, no matter what may be its moral complexion, is apparently never likely to suffer any longer in this country from lack of candidates in broadcloth and white linen, solicitous of the honour of declaring on behalf of it that "black is the white of their eye." If the operative silversmith could only bring his mind and conscience to the point of boldly claiming 25 per cent. of his employer's accumulated stock as a minor incident in any agitation for the repeal of the silver duty, he would only have to stick to his demand with a sufficient amount of pertinacious audacity and his path would be made easy to him. Birmingham would rally to him: the caucus would be his friend: even peers of almost saintly odour would be ready to argue on his behalf in their place in Parliament that with this large cantle cut out of their personalty, the masters would, if anything, be rather richer than they were before.

We, however, suspect our working friends are too honest to follow our advice. It is a painful conclusion, but one we cannot help arriving at in reference to our present subject; that if the alternative is between starvation and the success of any moderate kind of appeal to official reason, as represented by the particular member of the Barnacle family now in office, the operative silversmith may as well accept his fate in silence.

67, Cornhill. C. M. SMITH.

[In publishing this communication we do not hold ourselves responsible for the opinions and statements of our correspondent.—Ed].

◆

Sir John Bennett writes: "In spite of the turmoil of a chaotic session, we hear of measures passed for the simplification and acceleration of legal proceedings. Nobody but a lawyer denies that this is a step in the right direction. Four months ago, at the festival of the Birkbeck Institution, with the Duke of Albany at the stone and the Archbishop in prayer, an accomplished man of peculative business transferred my watch and chain into his own pocket. Forty pounds reward failed to find the lost property for a month. Then Scotland Yard ferretted out £2000 worth of stolen diamonds, and in the thief's pocket was my watch. The man was sent for trial by Mr. Hosack, at Clerkenwell, on June 21. Under a doctor's certificate, Sir Vernon Harcourt let him out on bail against his trial at the Old Bailey. Somehow his state of health is unsatisfactory, and so I am kept from month to month waiting for his conviction, and the restoration of my watch, which still remains in the custody of the magistrate. Surely such a case of the law's delay should have some speedy remedy."—*The Citizen.*

Art-Teaching on the Continent.

In accordance with the request of the Royal Commissioners on Technical Instruction to gentlemen connected with the Science and Art Department at South Kensington, Mr. Armstrong and Mr. Bowler paid visits last year to France, Bavaria, and Saxony, to observe the provisions made in those countries for instruction in art. They were well received by the public authorities and by directors of the various schools, and their reports, which are appended to the general report of the Department, contain many facts of interest. Much more attention is paid to art-teaching of all kinds in France than in this country, and money is liberally voted for it, both by the municipalities and the State. Last year the Town Council of Paris voted 800,000 francs for drawing schools, and the instruction is quite free. Great pains are taken to obtain good teachers, and the higher instruction of the Académie des Beaux Arts furnishes a class, for which we have no equivalent in England, from which inspectors and other superior officers can be taken. At the same time neither pains nor money are spared upon school apparatus, the supply of fresh and sharp casts, and the keeping of them clean, as well as the provision of good lighting—points, as Mr. Armstrong remarks, of the first importance. French boys and girls do not seem to show greater natural aptitude for art study than English, and the results obtained are not generally better than in our own schools. With regard to workmen, Mr. Armstrong states that he met in Paris an intelligent young English woodcutter, who had been a student at the West London School of Art, to whom he put the question how the men in his trade in Paris would compare with those in London. His reply was that the Paris cabinet-maker, or wood carver, had generally an advantage over the English workman, in being able to set out by drawing the work he intended to execute. It was his further opinion that the Parisian workman would get through a given amount of work more rapidly than an Englishman, but he would work fewer hours in the day or fewer days in the week. Among the elementary drawing schools of Paris is the Ecole Nationale des Arts Décoratifs, at which boys of ten are received at the morning classes, being able to read and write, and at fourteen for evening classes. The work done at this institution was carefully examined by the English visitors, who came to the conclusion that modelling from life was not so good as that of the best student in training and national scholars at South Kensington, though the average was perhaps better. In water-colour work there was nothing better than the best done by our English national scholars. There is a girls' drawing school in the Rue de Vieux Colombia, which receives a subvention from the Municipality of 3000 francs a year, as well as the rent of rooms, cost of gas, and a porter's wages, on condition of taking 25 free students three days a week, but there were actually 55 such students when the school was visited; 160 girls were on the books, of whom 128 were in attendance. The work produced in the Paris schools is better than that sent up from the country, in about the same proportion as the work at South Kensington excels that done in the English provinces.

At Munich there is an art school for workmen called the Fortbildung Schule, in which there are drawing and modelling classes in the evening and on Sundays. The payment is seven marks a year for all the classes, four marks for Sundays only, and three marks for evenings only. Most of the students come prepared with a certain degree of knowledge, as drawing is taught in the upper classes of the elementary schools for three or four marks a week. At this institution there were but 50 out of 750 students who had no trade. Art work of almost every kind is pursued in the Fortbildung Schule. In the architectural room the visitors found 17 students at work, but the average number is said to be 50. All were young men over 16, and mostly of the better class of masons and joiners. They work five hours on Sundays, and on four nights in the week as well. Advanced students at the Fortbildungs Schule are promoted to the Kunstgewerbe Schule by competition. This establishment, which is housed in a large and handsome building, is meant entirely for artisans, but it is found impossible to exclude students who intend to become painters if they fulfil the prescribed conditions. It is so full that 40 per cent. of the applicants for admission are obliged to wait for vacancies. There are 180 students, of whom but 40 are Bavarians. Of these, 20 have scholarships entitling them to 350 marks a year and free instruction. No Bavarian, properly qualified, is excluded for want of money to pay the fees, if he can produce a certificate from the burgomaster of his town that he is really poor. Only two or three students were found in this position. Students are occasionally sent to finish their education in Italy. They get 800 marks to spend on the journey, and on coming back have to show their work, and give three or four of their drawings to the school. There is a department for girls in the Kunstgewerbe Schule; the visitors saw nothing very remarkable about the pupils' work. In the Munich elementary schools writing and drawing are taught together to the youngest classes. The writing is the angular Gothic, and this is done on slates, on which the children have first to move their fingers up and down from right to left, on the top and bottom, and diagonally from corner to corner, as the teacher directs. A rotatory movement is then made from right to left, and *vice versâ*. These movements are followed by drawing with slate pencil on ruled lines, copying the teacher on the blackboard. Such exercises are continued for three months, and thus the children are taught to write in the regular way, but do not begin what can be called regular drawing till they reach one of the three highest classes, by which time they will be at least 6½ years of age. At Dresden also there is a Kunstgewerbe Schule, and another at Leipsic. The work examined at Dresden was not better than is produced in London. Several elementary schools in Dresden were visited by the English delegates, but it does not appear that the visitors were particularly struck by what they saw.

Both in Bavaria and Saxony art-teaching is carried on, as Mr. Armstrong conceives, under more favourable conditions than with us. Without expressing any opinion on the propriety of devoting Sunday to its pursuit, it is pointed out that, as a matter of fact, the Sunday teaching is most important in Germany. Sunday is the great day for instruction in the Fortbildung Schule, and it is a common practice also for masters to set their operatives and workmen at liberty to attend art classes on Thursday afternoon. More assistance is given in France as well as in Germany by the State and municipalities, and in all the towns visited there survive art traditions, such as do not exist in London or other English towns. The Parisian workman is accustomed to see good sculptures, good paintings, and fine examples of all kinds of decorative art. On Sundays he visits museums and galleries where all these things are to be seen at their best. It is much the same in the German capitals, and it is only fair to suppose that an hereditary appreciation of beauty has been thus developed which we should not expect to find in England. Mr. Armstrong does not believe that the French, and, still less, the German, peasant can be more easily trained as an art workman than the Englishman, nor that the Paris bourgeoise class is superior in that respect to the like classs in London, but "the artist and the art workman in Paris, in Munich, in Dresden, and in Nüremberg has the start of us, and it would be foolish not to realise that in some respects we carry extra weight in the race." The point in German art teaching, however, which most struck the English visitors is the preparation in the elementary schools for the teaching in the art schools. Drawing is not taught in 75 per cent. of our elementary schools, and thus the English lad of the artisan class must almost always come to the art teacher as raw material, while in Saxony and Bavaria he is universally trained to neatness of handwork, if to nothing more. It is satisfactory to read that the visit of Messrs. Armstrong and Bowler to France and Germany has not led them to the belief that the main scheme of art education in this country can be changed with advantage.

Trade Notes.

The annual trial of chronometers at the Royal Observatory, Greenwich, terminated July 28th. Mr. Kullberg has accomplished the hitherto unrivalled feat of heading the list three years in succession, and his second chronometer, which was sixth last year, is fourth. Mr. Robinson, of North Shields, is second, and Messrs. James Poole & Co. are third. Mr. Williams, of Cardiff, is fifth. The complete list, which we intend to review in detail next month, shews the usual uncertainties connected with the trial. An American chronometer by Heinrich, of New York, bearing the modest number three, is eighteenth—not a bad performance for the first time; but probably it has not fulfilled the expectations of its maker. The experimental instrument of Mr. Schoof heads the last group. We would refer our readers to the article on Chronometers *v.* Levers, in our last issue.

What will the Clockmakers' Company do? is the question which has probably been propounded many times by those who are interested in the matter. Mr. Kullberg, having taken both the first and second prizes, is, by their rules, excluded from further competition. Last year only one prize (the second) was given, and should the owner of the second chronometer fail to establish a claim of being the actual maker of it, the prizes will lapse altogether. Mr. James Poole, who has personally sprung and adjusted four of the chronometers which have been purchased by the Admiralty from the last three trials, is one of the real workers at the trade, having had upwards of fifty years' close application to the bench; and, apart from personal feeling, we think that some official recognition on the part of the Company would be a graceful act.

On page 40 will be found an article from the pen of Mr. C. S. Murray, relating to Decimal Chronographs, as recently dragged into celebrity in the Coventry law courts. The term "Chronograph," like that of "Chronometer," has been made subservient to advertising purposes, and is fast losing its original significance. The expression literally means "writing time," and this can only be done by having fixed points of reference, such as ink marks on the dial, or noting the distance between a hand set to zero, and another, stopped at the conclusion of the event, the watch itself going on without interruption. The pretensions to any "invention" connected with a particular "beat" are simply ridiculous. A 16,200 train, as commonly used in English watches, because it carries a good balance, has 4½ beats to a second, or 9 in two seconds. All "quick" or 18,000 trains beat 10 to two seconds. While writing, we have a watch before us, having on the dial, "Patent Decimal Chronograph, Registered, September 13th, 1875." It is an ordinary centre-seconds, with quick train, and has a stop-work. Like some other advertised specialities, the designation is only a play upon words, and we are surprised that this feature was not more distinctly brought out during the trial.

Mr. A. Bedford, the able and energetic representative of the American Watch Company, of Waltham, Mass., sends us a remarkably neat leaflet, intended for distribution by retailers, which sets forth, in a concise form, the principal facts connected with the Company's operations and position. We cannot help noticing, with perhaps pardonable regret, that it claims to produce more watches annually at the works at Waltham than all the manufacturers of England combined. Further details will be found elsewhere.

* * *

The *Revue Chronometrique* (for August and September), which is suggestive of an Editorial holiday, is almost entirely devoted to a detailed account of the presentation of prizes to the successful pupils of the School of Horology, at Paris, on July 8th. M. Hérisson, Minister of Commerce, presided, supported by M. de Heredia, Honorary President; M. Rodanet, President; M. Saunier, and a distinguished gathering of municipal and scientific gentlemen, including the Prefect of Police. The ceremony was held, as previously announced by us, at the Palace of the Trocadero. We note that the first prize of one thousand francs was withheld, none of the candidates having fulfilled the conditions of competition: thus shewing that the judges exercised a wise discretion in not making its acquisition too cheap.

* * *

At the conclusion of M. Hérisson's speech, which proved that he had thoroughly mastered the details of the matter in hand, he, in felicitous terms, presented M. Rodanet with the cross of a Chevalier of the Legion of Honour, and gave him the *accolade* in the name of the President of the Republic, amidst enthusiastic applause.

* * *

We had the pleasure of making the acquaintance of M. Rodanet during the Maritime Exhibition, held at Paris in 1875, and cordially congratulate him on his new distinctions.

* * *

The Duke of Devonshire has just presented a clock to the Buxton Hospital, which is fitted with all the latest improvements. It has four illuminated dials, each six feet diameter; chimes the Cambridge quarters, and strikes the hours upon a 15 cwt. bell. The cost of the work has been about £500, which has been carried out by Messrs. John Smith and Sons, Midland Steam Clock Works, Queen Street, Derby.

* * *

Upavon Church, Wiltshire, has been recently enriched by having a large clock placed in the Tower, which strikes the hours, and shews time on a five feet copper dial. This has also been erected by Messrs. John Smith and Sons, of Derby.

* * *

Mr. Henry Lindley, the Moor, Sheffield, forwarded us some time ago a bottle of his Plate Cream, and we have given it a thorough test. Experience has taught us to be very careful in recommending powders and solutions for cleaning gold and silver, as with very few exceptions these preparations have only proved of temporary benefit. It is true that the tarnish is generally removed with ease and rapidity, but in most cases the polish obtained is of very short duration. This, of course, is a great drawback, as a too frequent application of strong solutions is not only a waste of time and labour, but is sure to result in gradual depeciation of the articles manipulated. From this drawback we are glad to notice Mr. Lindley's preparation is free. His Plate Cream not only removes stains and tarnishes immediately, restores the original colour and brilliancy, but it is also lasting in its effects and without injurious effects on the goods. Many of the leading silver and electro firms of Sheffield, such as Walker and Hall, Mappin and Webb, Martin Hall and Co., John Harrison and Co., &c., use this plate cream, and have gratified the manufacturer with many favourable testimonials. We can, however, answer ourselves for the value of the article, and we heartily recommend all our readers to send for a sample bottle, and thus assure themselves of its efficacy.

The Pyx and the Goldsmiths' Company.

The trial of the Pyx at Goldsmiths' Hall is one of the most interesting ceremonies remaining to the Guilds of the City, although its importance this year was somewhat diminished. In consequence of the very important alterations and additions which have been for some time in progress, both to the structure and to the machinery at the Royal Mint, the coinage of both gold and silver has, during the past twelve months, been much below the usual average. No doubt now that everything is in working order, the Deputy-Master will shortly be called upon to undertake a very large gold coinage, to make up for the exhaustion of stock in hand, consequent upon the fact of its manufacture having been so long unavoidably discontinued, and also for the very considerable amount of gold which must before long be called in on account of its yearly increasing lightness—a most important commercial feature to be considered in the case of a currency like ours, whose only standard is that of gold—silver, as is probably generally known, being in this country in the nature of a token coinage. Only £1,053,208 of gold, all in half-sovereigns, and £569,844 of silver had been coined at the Mint during the year which ended on June 30th, although, in fact, no coining operations could be commenced until December 21st, on account of the reorganisation of the structure and machinery. Nevertheless, at the trial of the Pyx at Goldsmiths', the same careful scrutiny and the like exceedingly delicate and minute scientific tests have to be applied by the jury empanelled for this purpose. The jury is composed entirely of freemen of the Goldsmiths' Company. The onerous and very important duties connected with such trials have been undertaken by the Company now for many centuries past, added to which it has always been their hospitable custom to entertain the principal fiscal officers of State, and the various head and other officials of all the public departments more or less interested in the work of the day, besides numerous friends, at a banquet in their hall on the evening of the day of trial. At the hour fixed for the trial, eleven a.m., the following gentlemen were assembled in the Board-room of the Goldsmiths' Hall, viz.: Sir W. F. Pollock, the Queen's Remembrancer, who presides on such occasions in lieu of the Lord Chancellor, who, previous to the year 1870, almost invariably attended personally. The Queen's Remembrancer was attended by Mr. Hankins, the senior officer of his department; the Hon. C. W. Fremantle, C.B., Deputy-Master and Controller of the Mint; Professor W. Chandler Roberts, F.R.S., assayer and chemist of the Mint; Mr. Chaney, the officer in charge of the Standard Weights and Measures Department of the Board of Trade, who produced the scales and weights, and likewise the gold and silver standard trial plates for use by the jury; and Mr. Walter S. Prideaux, the clerk of the Goldsmiths' Company. The following gentlemen were sworn by the Queen's Remembrancer to serve on the jury, viz: Mr. John Gray, who was chosen as foreman; Mr. George Matthey, Mr. Francis Boone Thomas, Mr Stephen Smith, Mr. George Lambert, Mr. Charles Hoare, Mr. Robert Ruthven Pym, Mr. William Robinson, and Mr. Henry Pizey. After the Queen's Remembrancer had addressed a few words to the jury upon the valuable improvements and alterations effected at th

Mint during the past twelve months, rendering it now capable of carrying out rapidly and efficiently any amount of coinage it may be called upon to execute, and pointing their attention to the delicate nature of the tests they were bound by law to apply to the coins submitted to them for trial, the jurors retired to their laboratory to carry out the duties assigned to them, first possessing themselves of small pieces of both trial plates to guide them in their assay of the gold and silver coins in the Pyx. It was arranged that the Queen's Remembrancer should meet them at half-past six to receive their verdict. The jury commenced their operations by first ascertaining that the number of coins of gold or silver contained in the several packets deposited in the Pyx corresponds with the amount which the officers of the Mint represent them to contain. They then took from each packet as many coins of all denominations as they considered necessary for the purpose of a thorough trial, and weighed each coin separately to ascertain that it was within the prescribed legal remedy as to weight. They next melted these coins into ingots, which are most carefully assayed and compared with the portions of the standard trial plates already mentioned, to ascertain that the metal is within the remedy as to fineness. The remainder of the coins so taken out of the packets in the Pyx were then weighed in bulk to ascertain that their weight was within remedy; and certain coins being taken indiscriminately from such residue were assayed separately, to see that they are within remedy as to fineness, all of which results had to be set out in their verdict. To render the above remarks intelligible to the general reader, it is necessary to explain shortly the meaning of the words "remedy" and "fineness" as above used. The remedy as to weight here spoken of is an allowance made by the Crown to the Deputy-Master for any loss which may accidentally and unavoidably occur in the striking of the various coins. Although this remedy is exceedingly minute, yet it is invariably kept well within, as all previous verdicts at such trials will show. The following short extract from the first schedule of the Coinage Act, 1870, gives the weight in imperial grains, and the remedy allowed on the manufacture of those coins most common in circulation:—

Coins.	Weight.	Remedy.
Sovereign	123·27447	0·20000
Half-Sovereign	61·63723	0·10000
Crown	436·36363	1·81818
Half-Crown	218·18181	0·90909
Florin	174·54545	0·72727
Shilling	87·27272	0·36363
Sixpence	43·63636	0·18181

The standard fineness for gold coins is 11-12ths fine gold and 1-12th alloy, or millesimal fineness 916·66; the remedy, or deviation from standard allowed to the Master on working being millesimal fineness 0·002. For silver coin the standard fineness is 37-40ths fine silver and 3-40ths alloy, or millesimal fineness 925·; the remedy being millesimal fineness 0·004. On this occasion, as indeed it has been for many generations past, the result of the trial was most gratifying to the Deputy-Master and his staff, and most satisfactory to the public, who may rest assured that our gold and silver coinage is all that the law says it shall be. The verdict, which was duly rendered to the Queen's Remembrancer at the hour appointed, was read aloud publicly, and verified by the signatures of Sir F. W. Pollock and the jurors. It has since been published in the *London Gazette.—The Citizen.*

Patents.

BRITISH PATENTS.

Applications for Letters Patent.

3578. **William Samuel Harrison**, of Huntingdon Street, Barnsbury, in the County of Middlesex, Clockmaker and Electrician, for an invention of "Improved Synchronising and Time Signalling Mechanism for Clocks."

3636. **William Robert Lake**, of the firm of Haseltine, Lake and Co., Patent Agents, Southampton Buildings, London, for an invention of "Improvements in Watches."—A communication to him from abroad by Frederick Fitt, of Chaux-de-Fonds, Switzerland.

3763. **Gustav Maximilian Herotizky**, of Hamburg, Germany, for an invention of "Improvements in Electric Clocks."

FOREIGN PATENTS.

German Empire.

23,583. **L. Weinek**, of Leipzig, and **O. Wigand**, of Zeitz, for a Universal Time-piece."

United States of America.

280,394. **Theodore Mueller**, of Philadelphia, Pa., for "A Watch-Case."

280,463. **Jas. H. Gerry**, of Somerville, Mass., for "A Gravity-Escapement for Clocks."

280,715. **Charles E. Buell**, of New Haven, Conn., for "An Electric Clock System."

280,867. **Sylvanus Sawyer**, of Fitchburg, Mass., for "A Watchmaker's Lathe."

280,719. **Duane H. Church**, of Chicago, Ill., Assignor to the American Watch Company' of Waltham, Mass., for "A Stem-Winding Watch."

280,936. **Alvin Lawrence**, of Lowell, Mass., for "A Clock Escapement."

281,059. **George Hartje** and **Frederick Hartje**, of New York, N.Y , for "The Manufacture of Gold for Jewellery."

281,292. **Adolphe Onslow**, of Jersey city, N.J., for "A Pendulum-Scale."

281,295. **Roswell L. Peabody**, of Waltham, Mass., for "A Straight-line Watch."

281,371. **Adam Keller**, of New York, N.Y., Assignor of one-half to John C. Downing, of Newark, N.J., for "A Bracelet."

281,465 **Jno. M. Crawford**, of Philadelphia, Pa., for "Illuminating Clocks."

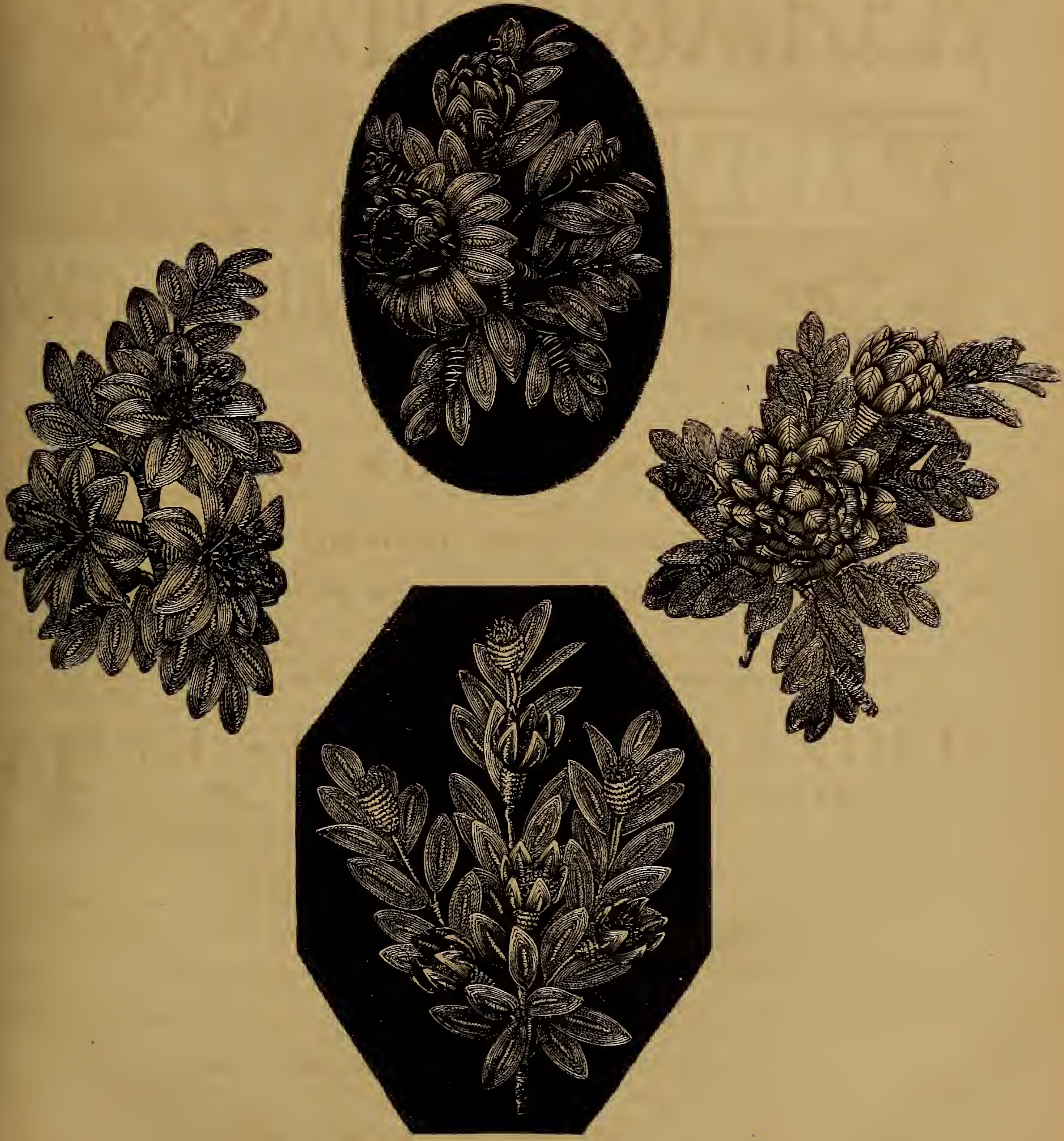
281,493. **Fred L. Gregory**, of Neligh, Nebr., for "A Second-hand Attachment for Clocks.

281,585. **Gustavus G. Wagner**, of Mount Vernon, N.Y., for "Synchronising Clocks."

281,628. **Warren Holden**, of Providence, R.I., Assignor to Fowler Brothers, of the same place, for "A Bracelet."

Supplement to the Watchmaker, Jeweller, and Silversmith, Sept., 1883.

MONTHLY SUPPLEMENT OF DESIGNS.



Designs for Filigree Work.

The Watchmaker Jeweller and Silversmith

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TWO ILLUSTRATED SUPPLEMENTS:—1. Design for a Cup. 2. Antique Rings and Ornaments.

The Manufacture of Repeating Watches.

We continue the translation of Mr. John Huguenin's article in the *Journal Suisse d'Horologerie*, and have adhered as closely as possible to the original, but many of the directions are not applicable to the manner in which repeating movements are completed here; their painstaking minuteness is, however, a sufficient reason for their reproduction.

Casing.

Before sending the frame to the case-maker, it is necessary to ascertain that it is perfectly true from the centre hole, in order that the middle of the case and the circle of the dial may be equally concentric. The socket of the winder should be screwed on, and one of the wheel bars for the height of the rim of the case.

In flat movements, in order that the bells may have sufficient space, the pillar-plate should pass through the case on the dome side, and in hunters, the case-springs ought to be entirely inside the band.

If the case is obliged to have a glass under the dome, a block should be put on the upper-plate or on the bar, the same height as the square of the barrel arbor, in order to ensure sufficient room in the glass. This same block will also serve for cases with ordinary domes, which, when shut down, should nearly touch it, that is, if the cases are desired to be closely made; otherwise there will always be lost room on the dome side, the pendant being placed in the middle of the band.

When hunting repeaters have many hands passing over each other in the centre, it is advisable to give the case-maker the required height above the dial; this will serve as a base for him in dividing the case, and will ensure sufficient room being left for the glass.

The joints are generally placed opposite the pendant, but in uncovered pieces, where the disposition of the striking work varies according to the calliper, it is often necessary to place the bottom joint opposite the nibb, between the fourth and fifth hour, to obtain room for the action of the slide.

It is always preferable that the dome joint shall be outside the circle of the middle part of the case; as much to ensure space for the bells, as to preserve the movement from dust.

The case-maker should be told that the places for the case screws are marked on the plate, in order that he may not forget to solder the blocks.

A false dial should be furnished for crystal glass cases, a shade thicker than the dial which will be ordered for the piece. The minute circle of the dial to a minute repeater requires to be perfectly concentric with the centre hole of plate. To easily obtain this a strong edge should be made, well fitted on the plate, and quite free of the shutting edge of the glass bezel.

Case Fitting.

The case being made, it is sent with the frame to the case-fitter, the pendant soldered or not, with the bow and the gold for the slide; the button may be furnished either by the manufacturer or by the case-fitter.

Add the necessary parts for the action of the winding and the setting hands mechanism; these are, the winder, the winding or "crown" pinion, the sliding pinion, the spring bar, the buckle, the setting hands spring, and the minute pinion. This last is not necessary when there is a push piece to set the hands; the depth of the sliding pinion, with the minute pinion, being regulated by the examiner. But it is indispensable for the other kinds of hand-setting, which ought to be delivered by the case-fitter entirely in action, and the depth correct.

For the slide; the rack should be put in its place with its bridge and the star carrying the hour snails, to indicate to the case-fitter the forward space necessary for the action of the quarter-piece in pushing on twelve hours.

There should be no play in the slide after the rack has been entirely brought back. It is advisable to ascertain that the watchmaker who has taken the movement to pieces has marked on the plate, in an exact manner, the point of the return of the rack. For that, the barrel arbor of the small train should be put in, the pinion of the rack screwed on the twelve-toothed ratchet, the hammer and the lifting of the hours, that of the quarters of the large hammer, the quarter piece, the long piece or the stopping spring, the rack, and the finger which brings it back.

It is easy to find the agreement of the teeth of the rack with the pinion, in pushing on one hour, and twelve, as well as the place of the finger which brings back, on the barrel arbor; and for the minute pieces, the agreement of the toothed semi-circle which carries the pin, with the inside teeth of the quarter-pieces. The whole being put on, the quarter-piece should be brought back, either by the rack or the square, until the stopping has taken place, and then mark by a line on the plate the position of the rack, if this was neglected to be done before taking the movement to pieces.

The watchmaker sometimes orders the case-fitter to supply the bells. In this case he will add to the pieces connected with the case-work those which are necessary for making the bells, according to the recommendations contained in the following chapter.

The Bells.

After the case-work the bells must be made, the two hammers must be put in, their springs, counter-springs, the adjusting screws, which ought to be adjusted without play in the plate, and act against the counter-springs in such a manner that the hammers lift sufficiently when they are screwed to the bottom.

One of the bars (or cocks) should be put on, that is farthest from the head of the bells, for preference that of the escape-wheel, when the screw is near the tail. When the spring bar is placed outside the circumference of the bars, without being sunk in the thickness of the plate, it ought to be put in its place. The spring of the bell ought to pass over with sufficient space for the vibrations.

Make sure that the frame fits in the middle part without play, and that the case screws bind well; they ought to form a right angle with the blocks, so that in screwing and unscrewing they shall not cut them. The plate will then remain well fixed in the band.

Send the piece with the case complete, at all events with the dome on.

Examination of the Case-Work (*Extracts*).

In hunters, it should be ascertained that the shoulder of the winder, in pushing the lock spring, does not catch in the edge of the hole; this is a bad fault, which can only be corrected by changing the position of the spring in the band, or stopping up the hole which has been made too large.

Make sure that the head of the spring does not touch the edge of the dial, or of the bezel, when it is pushed in.

The winder ought not to have more play with the cover shut than when it is open; and if the play is considerable, the head of the spring must be filed, to allow it to follow up to the shoulder of the winder when the cover is shut.

The setting hands spring ought to act freely, and bring back the sliding pinion in such a manner that the teeth go to the bottom of those on the crown pinion.

When there is a locking arrangement for setting the hands, the spring ought to be firm, and to keep the depth of the sliding pinion, with the set hands pinion, to the bottom of the teeth, should the former be small, and at a moderate depth, if it is comparatively large.

The opening in the plate should be large enough to allow the winding and sliding pinions to be put in, and taken out, from the dial side.

Action of the Slide.

If, in pushing the slide in such a manner that the arm of the rack is just supported against the snail on the twelfth hour, this pressure takes off the freedom of the star; the run of the slide is sufficient to reach over twelve hours. On the return the rack ought to join the line marked on the plate.

The slide ought to be perfectly free and almost without play, the screw being well home. It should be tried with the band alone, and also with the case complete. If it is tight, take it to pieces; and if it is provided with a return spring, ease the steel arm on which it runs. Examine the band with care, and if it has been put out of truth, send it back to the case maker to make right. If one of the edges was slightly bent, it can be easily made right by the help of a piece of bone or hard wood.

Then put the slide against the band, and if light can be seen, either at the middle or the ends, it must be made to agree with it by careful bending. The band is often unequal, or externally ornamented. It is better in this case to file and stone it in such a manner that the gold exactly adjusts itself against the circumference. The block of the slide ought to have a little play in every part of its run, in the opening of the band. It is a good condition for it to be equally free with the case open or shut.

The piece of steel which acts in the inside of the band being well cleaned, put it in with the slide, taking care to screw it home. Work it backwards and forwards, in order that the steel shall mark the parts where it touches the band, from which the solder should be removed by the aid of a sharp graver of a convenient shape. Then take the slide to pieces, and remove with a file all traces of rubbing on the steel, on which should be left no sharp edges; remount it, after having well polished and cleaned it, and recommence the operation, until it is completely successful.

It sometimes happens that when the slide is screwed on, the gold does not lie close up to the band, although when tried alone, it follows the shape exactly. This proves that the block is not filed in agreement with the notch in the steel, or, perhaps, it cannot be screwed to the bottom; it may be that it fits too close in the opening of the band, or that the screw, or steady pins, being too long, touch at the bottom.

To ascertain this, the steel piece and the slide should be screwed together without the middle part of the case, and then examined to see that the screw, the steady pins, or the sides of the block do not bind, and in the case where the curves of the steel piece and of the slide are not concentric, this fault should be corrected by filing the part of the block which lays against the steel piece in such a manner that the slide shall agree with the band in its whole length. Freedom ought to be obtained by proceeding in the manner which has now been indicated.

The guide of the return spring ought to be put in agreement of height and circumference with the hole in which it works when the slide is pushed, so as not to restrain the liberty of the latter. Pay attention that this spring does not touch the band or the steel of the slide.*

When a hunting repeater has been cased very closely, the case springs should be filed away as much as possible, so as to give sufficient room for the bells. The screws of the latter ought to fairly bind the block, or foot, on the plate without restraining each other, and the heads ought to be free in their sinks.

To be Continued.

The Worthies of Horology.

By C. Stuart Murray.

XVI.

THE CLOCKMAKERS' COMPANY.

Third Part.

I CONCLUDED the previous paper with some particulars about the standard yard of England, and I will resume in the present one some more extracts from the journals of the Company.

In the year 1761 the Company made an application for a coat of arms for itself. After the traditional formality of "taking into consideration" by the Heralds' College, the wished-for "coat" was at length granted by Sir Edward Walter, Garter King at Arms. It consisted of a table clock resting upon four lions, and surmounted by an imperial crown *or*, that is, of gold. Although there are crests, a motto, and supporters now, I have not found that any were granted at the date named. Matters seemed to have gone on pretty smoothly for half-a-dozen years, until one Mr. Matchett, an Assistant of the Company, was suspended from attending for—what does the reader think? "He being well known to be a Popish recusant!" How times have changed since then. Four years afterwards; namely, in 1682, the Court of Assistants was engaged in more useful and sensible work than the belonging to "Popish recusants." Mr. John Catsworth, watchmaker, and Mr. Francis Dennis, engraver, were "had up" before the Court, and fined for making unworkmanlike and insufficient movements, and engraving false names thereon. Ah, ha! Messrs. Catsworth and Dennis, that was far more dishonest than any amount of recusanting. Mr. Matchett, however, after enduring the hardship of suspension for nearly ten years, had it taken off, and was restored to his place in the Court. The entry does not say whether or not friend Matchett played a second act, after the manner of the Vicar of Bray, of ancient history. That reverend gentleman's name was Symond Symons, and he preferred his living to all other earthly and, apparently, heavenly considerations.

The Bray of this anecdote is in a parish in Berkshire, upon which the town of Maidenhead, on the Thames, partly stands. Several more or less correct different accounts of it have from time to time appeared in print, but the most reliable I take to be the following. Fuller, in his "Worthies of England," thus relates the story. "The vivacious Vicar hereof, living under King Henry VIII., King Edward VI., Queen Mary, and Queen Elizabeth, was first a Papist, then a Protestant, then a Papist, then a Protestant again. He had seen some martyrs burnt (two miles off) at Windsor, and found the fire too hot for his tender temper. This Vicar, being taxed by one for being a turn-coat and an unconstant changeling,—"Not so," said he, "for I always kept my principle, which is, to live and die the Vicar of Bray." Such many, now-a-days, who, though they cannot turn the wind, will turn their mills, and set them so, that wheresoever it bloweth their grist shall certainly be grinded. Who will pretend to say that there was not deep, worldly wisdom in the conduct of the "worthy clergyman," and sound philosophy in Fuller's relation of it. And that is the story of the Vicar of Bray.

As I continue my journey, I find something very important in its relation to modern horology. I read:—

"1688, September 29.—Be it remembered that in pursuance of the order of the Court, of the 8th day of February, $168\frac{7}{8}$, and according to the Court of the 5th March, $168\frac{7}{8}$, the patent endeavoured to be obtained by one Mr. Edward Barlow, a priest, and to be granted to him by the King's majesty for his sole making and managing of all pulling repeating pocket clocks and watches, he pretending to be the true and first inventor of that art and invention, was by diligence and endeavour of the Master, Wardens, and Assistants of this Company, with great charge and expense, which was borne by and out of the stock of the Company, very successfully prevented; and upon the 2nd of March, $168\frac{7}{8}$, ordered by the King in Council not to be granted."

The peculiar numerals of the year ending in $\frac{7}{8}$ will require some few words of explanation, in order to render them intelligible to the reader..

The fraction figures $\frac{7}{8}$ refer to the old and new styles of the calendar, which were then struggling for mastery among the public, as a voluntary matter. It is one peculiarity of the free and independent Briton, that he takes a long time to alter anything, even from clearing out a deplorably incompetent mob of vestry bumbledom, to rectifying the day of the month.

It is not generally known that an effort was made to reform the calendar in this country as early as the reign of Queen Elizabeth. On the 16th of March, 27th Eliz., 1584-5, a Bill was read the first time in the House of Lords, entitled, "An Act giving Her Majesty authority to alter and new make a calendar, according to the calendar used in other countries." That Bill was read a second time on the 18th of the same month of March, after which no notice occurs of the proposed measure. The Lords' journals have an entry of it as above, but, much to the regret of the historians of our time, the journals of the House of Commons were not then preserved.

The Julian method of reckoning was called the old style, whilst the Gregorian was named the new. The Julian era precedes the Christian one by forty-five years, and is the reformation of the Roman calendar by Julius Cæsar. As Emperor of the Roman world, he ordained that the year of Rome 707 should consist of fifteen months, forming altogether 445 days; that the ensuing year, 708, should be composed of 365 days; and that every fourth year should contain 366 days, the additional day being introduced after the 6th of the calends of March, *i. e.*, the 24th of February, which he called Bissextile. The "calend" was the first day of the month, taking the name from the priest's *calling* it out at appointed places to the people. They named those days *kalendæ*, from which our term calendar is derived. I have heard people ask why the name "Bisextile" is always put into the almanacs. It is from *bis*, twice, and *sextus*, the sixth of the calends of March, or 24th day of February, which was reckoned *twice* every fourth year, on which a day is added to the month of February to make up for the excess of six hours which the civil year contains above 365 days. But there is no more occasion to retain the term bisextile in our almanacs than the *Ides*, or eight days in each month, and the *nones*, or the fifth days of some months and the seventh of others.

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* [Most English repeaters have a return spring under the dial, acting directly on the rack. The gold slides are also sunk in the thickness of the band.—Ed].

The errors of the Julian mode of reckoning time had so far arrested the attention of astronomers, that pope Gregory the Thirteenth, in his character of Sovereign Pontiff, undertook to reform the Roman calendar. The alteration was made in October, 1582, and had given to it the name of the New Style. After long and serious consideration he published his new, and ordered that ten days should be deducted from the year 1582, by calling what, according to the old calendar, would have been the 5th of October, the 15th of October, 1582. It was adopted nearly all over Europe in the same year. In Germany, the Catholics took to the Gregorian calendar in 1584, but the Protestants held on to the old; they, however, ultimately adopted one by Wiegel, and so continued the somewhat amusing spectacle of Catholics and Protestants celebrating Easter upon different days in the same town, and even in the same street. The wonder of this age is, that Easter cannot be fixed to fall upon a given date of a given month, as Christmas has been. It would be far more convenient than having it running about through some five weeks of the months of March and April, with its Dominical Letters, Golden Numbers, Epacts, Easter limits, and troublesome computations to find a day to fall upon. In fact, these movable feasts are a standing rebuke to the common sense of the nineteenth century, now that holidays from general business have become so extensively associated with them. They have nothing, religiously, to do with the work-a-day world; but, if they are to be retained, let Easter Sunday be the first Sunday in May, and the others accordingly. Or, failing that, let the holidays of business life be so fixed that signs of summer may be in the ascendant, and people can take their Easter holiday trip into the country without railway rugs, great coats, &c., and the fear of returning home in a frosty air, snuffling and sneezing, and the probability of painful colds developing ultimately. What a pity that pope Gregory did not settle the whole questino.

I have said that it is one peculiarity of the free-born Briton to take his time, no matter at what inconvenience, to alter anything. And that peculiarity was well demonstrated in this matter of the Calendar. It came into use over the greater part of Europe in the year 1582, but we would have none of it until 1752, or about 170 years afterwards! But we are more creditable than the Muscovite, or the modern Greek, for they have not given in to the fitness of things yet. I may just add here that the difference between the Old and New Styles up to the year 1699 was only ten days; after 1700, it was eleven days; and after 1800, twelve days. By this it will be seen that the 1st of January, 1800, of the *old*, corresponded with the 13th of January of the *new* style.

It is, perhaps, not very generally known that at one time we had two years running side by side, as it were, together. There was the Historical year, which began on the 1st of January; secondly, there was the Civil, Ecclesiastical, and Legal year. This year was used by the Church, and in all public instruments, which began at Christmas until the end of the Thirteenth Century. After that time, it commenced on the 25th of March, and continued so until the 1st of January, 1753. It seems difficult for us to comprehend the turmoil of confusion that was in continual motion from the persistent use of these two dates; the second one being a blunder of the first magnitude. To think that in one kingdom the legislature, the church, and the worker in civil life, should refer every event which happened between the 1st of January and the 25th of March to a different year from the historian. But, the absurdity of retaining the 25th of March as the beginning of the year was still further shown—if such absurdity could further go in that way! The 25th of March was not so retained because it *was* the 25th of March, but because it was said to be the time of the vernal, or Spring equinox. Now, in the 18th Century this equinox had receded from the 25th of March to as far back as the 10th of March. Mr. Wilson, a mathematician, published a tract upon the subject in 1735, in a part of which he very logically observes:—

"But while we are maintaining this beginning of the year according to the rubric of the Common Prayer, we seem to forget that our year begins on the 1st of January, both in our common licensed almanacks, and even in the book of Common Prayer itself; and it may amount to a question very difficult to be answered, why the rubric of the Common Prayer enjoins the year to begin on the 25th of March, and yet the calendar for the Lessons, &c., begins on the 1st of January."

Another authority of the period says:—

"These anomalies, nevertheless, continued for seventeen years longer: and the reformation of the calendar, when it did take place, was offensive, in the highest degree, to a large part of the kingdom."

A remarkable example of this confusion may now be given: King Charles I. is said, by most authorities to have been executed on the 30th of January, 1648; whilst others with equal correctness from their computation, assign that event to the 30th of January, 1649.

Again, the revolution which drove James II. from the throne, is stated by some writers to have taken place in February, 1688; whilst, according to others, it happened in February, 1689. These errors arise from some historians using the *civil* and *legal*, and others the *historical* year, though both would have assigned any circumstance after the 25th of March to the same years.

I will now close the circuit upon what I hope has not been an uninstructive digression. To avoid, as far as possible, the mistakes which this custom has produced, it was usual to *add* the date of the *historical* to that of the *legal* year, when speaking of any day between the 1st of January and the 25th of March; thus:

$$\text{January 30, }164^{8}_{9}\left\{\begin{array}{l}\textit{i.e.}\text{, the civil and legal year.}\\ \textit{i.e.}\text{, the historical year.}\end{array}\right.$$

This will fully explain the date of $168\frac{7}{8}$ in the Journals of the Clockmakers' Company.

The 7 was the civil and legal year,
whilst the 8 was the historical year.

This practice, common as it has long been, is nevertheless frequently misunderstood, and even intelligent persons are sometimes confused by dates being so written. I trust, however, that by this exhaustive explanation I have somewhat simplified it. The lower figure always indicates the year of our present computation.

But here is wicked news from abroad. At a meeting in 1703, the Master and Mr. Quare produced letters from Patrick Cadell, of Amsterdam, stating that Cabriere, Lambe, and others, at Amsterdam, had set the names of Tompion, Windmills, and Quare on their work, and sold it for English.

Upon the 11th of December, 1704, a discussion arose which possesses a singular interest to horologists of the present day. This was at a Court which had been specially called upon the occasion of Nicholas Facio, Peter de Baufré, and Jacob de Baufré, having petitioned the House of Commons for an Act for the sole applying precious and more common stones in clocks and watches, and for the enlarging the term of their patent. Their reasons for such an Act were read, as also reasons of several members of the Court, by way of answer; and it was ordered that the Master, Wardens, and Assistants should petition Parliament, and oppose the Bill.

On the 5th of January, 1705, another special Court was held to receive further information. At that Court the Master reported "that there had been a constant diligence used in obstructing the Bill in Parliament, brought in on the petition of Nicholas Facio, Peter de Baufré, and Jacob de Baufré, for the sole applying precious and more common stones in clocks and watches, viz., That the Parliament had been petitioned against the Bill, and that the Petitioners had been heard by counsel before the Committee on the Bill, who had made such amendments to it that they thought it best to destroy it, and had therefore struck out all parts thereof, save the words, "Be it Enacted," and reported accordingly. The Master also acquainted the Court that in the proofs brought against the Bill there was an old watch produced, made by Ignatius Huggeford, that had a stone fixed in the cock and balance work that was of great use to satisfy the Committee; and it was ordered that the Renter-Warden do buy the said watch, if he can, to be kept for the members of the Court."

"The same was bought accordingly of Henry Magson for £2 10s., he having bought it of Henry Scale; and it was placed in the Master's hands,"

Facio was a mathematician, born in the Canton Geneva, and although the jewelling of certain parts of a watch movement had been done before, yet he was the first who had been able to drill holes in rubies to receive the pivots of the "balance wheel." Whatever stones had been tried before must have been of much softer quality than the ruby; had it been harder we should have heard of it. But the opposition of our Company was answered, and finally set at rest.

In the *London Gazette* of May 11, 1704, will be found the following notable announcement:—

"Her Majesty having granted to Mr. Nicholas Facio gentleman, of the Royal Society, Peter de Baufré, and Jacob de Baufré, watchmakers, her letters patent, &c., for the sole use in England, &c., for fourteen years, of a new art invented by them of figuring or working precious or common stones, crystal or glass, and certain other matters different from metals, so that they may be employed and made use of in clockwork or watchwork and many other engines, not for ornament only, but as an internal and vseful part of the engine itselfe, in such manners as have not heretofore been vsed."

The patent bears date May 1, 1704, and is number 371. And although Facio did not get it "enlarged," yet he drew profit enough out of it to make substantially, what he was scientifically, a veritable Worthy of Horology.

A Remarkable Watch.—We have just been shown the impressions of the engraving of a large watch, which, together with a correspondingly massive 22-carat albert chain, was made some years ago in Clerkenwell, to the order of a wealthy American manufacturer. The case (reversible) was four inches in diameter, and it contained twenty-two ounces of gold. On the centre part of the cover was an elaborately executed engraving of the factory buildings and grounds; and on the dome a portrait of the proprietor standing by his favourite horse.

The Clock of the Law Courts.

Two practical objections have been made to the projecting clock which adorns—if that be the accurate expression—the front of the Courts of Justice. The first is that there will be no possibility of telling the time, from the Fleet Street pavement, at a less angle than seventy-five degrees; and the other is, or was, that the intricacies of florid Gothic ornamentation which covered the dial would have made it exceedingly difficult to make out the time at all. To remove the clock from its present position would be to stultify the late Mr. Street's design of the campanile on which the jutting timepiece is placed. It will therefore remain where the architect placed it; but the mediæval foliation which confused the distant view of the figures and hands will give place very soon to a plain, commonsense surface, on which the hours and minutes are marked in clear alternation of black and white. Messrs. Gillett, Bland, and Co., of Croydon, the manufacturers of the clock and its chime of bells, have undertaken to remove the filigree dial, and, in its stead, to attach a plain pair of clock faces, which, being formed of opal glass, slenderly framed in iron, will be illuminated by gas after dusk. The change will be made before the works of the clock are set in their case, and already timbers have been thrust from the bell-chamber and made secure as a scaffold for the workmen. This lofty apartment, in which beams have been or are being fixed for the support of the bells, measures 22ft. from side to side, and runs back 25ft. from the front wall. The hour-bell weighs 3 tons, 12 cwt.; and there are four bells to chime the quarters. Ascending by 187 steps to the belfry, from which the clock projects at an elevation of about 110ft., the privileged visitor may find the measurements larger than he would probably have supposed them to be. The clock-case, now empty, is a chamber 12ft. long, and wide enough for two persons to pass one another without jostling. It commands a fine view of Fleet Street and the eastern portion of the Strand, with the open river beyond. Looking towards St. Paul's Cathedral, from the centre of the clock-case, the spectator mounted on this commanding level sees, by the turn of the long vista, that the storeyed steeple of St. Bride's Church vertically cuts the view of Wren's basilica into two equal halves. At the same time, the effect of the perspective is to make the nearer edifice appear almost as high as the lantern on the dome. The pierced Gothic tower of St. Dunstan's, one of the few praiseworthy works of its kind belonging to a period fifty years back from the present day, was seen to great advantage, the air being unusually free from smoke. Clear, likewise, was the view of St. Clement-le-Danes, looking like a trim, sharply-carved model, on a narrow little stand of green cloth; for at such a height you may see nearly all round the church and its meagre bit of graveyard, closed in with an iron palisade. While within the overhanging cage we may take note of the fact that the dials measure each 8ft. 6in. across. A strong wind was blowing in gusts, which would have made it perilous for the workmen to stand on the timbers outside the clock-case. Whistling through the unglazed openings on either side, the keen breeze made itself felt even in the partially sheltered interior. The new dials will have gilt rings and mouldings, the rest of the framework being painted white, in accordance with the opal purity of the glass faces, on which the hands, figures, and alternate minutes will show plainly in jet black. It is hoped that the clock will be in going order as soon as the courts are again open.

How to Finish a Full-Plate Fusee Watch.

(Continued from page 36.)

IN the instructions which we are about to give, the term "finishing" will be extended to mean actually preparing the watch for wear, and will include what is generally called "examining." Ordinary watches are just "jammed" together by the finishers, often before the plates have thoroughly cooled from the gilding, and the chain just stuck on the barrel and fusee.

We shall now proceed with the various parts in detail, commencing with the fusee, which is supposed to be fresh from the hands of the cutter. Sometimes the poke is bent up and requires bending square, the cap is then snailed; snailing tools can be purchased at all the tool shops. The one we have before us while writing is "home-made," and formed out of an old penny of the period of George the Fourth, which has been thickened on the edge by being struck round on an anvil. It is composed of good honest copper, and takes the emery better than the material generally used for these tools. A great deal depends on the emery, which frequently requires rinsing in clean water before using.

In setting the tool to the fusee cap, it must be so adjusted in the turns that it only touches it on one side of the arbor, otherwise the snail will be what is called a "false curl," that is, with the snails crossing each other, in addition to which the cap would look hollow. Anything properly snailed is, in reality, slightly rounding. Care must be taken not to work it off more than dry, or it will look what is termed "foxy."

For snailing brass a boxwood tool is used; the wood should be as hard as possible, and the emery requires to have rouge mixed with it (about one-third). In this particular watch we will assume that the great wheel to fusee, the bottom of the barrel, and the motion wheels are snailed. The fusee arbor may now be shortened to the case, and the end polished square. There are tools sold for this purpose, but very few of them take the arbor up true, the consequence being that the ends are not perfectly true; and this is found to be awkward if they require touching up again. A very simple and efficacious method is to use an ordinary screw-head tool, and fit in chucks made out of dog wood; these can be drilled to suit the size of any arbor, and there is no fear of the end being bruised by being screwed up. An expert touch is required on the polisher—zinc, with diamantine, is best. The fusee collet is blued. We have already described the process of blueing screws, in our July number, p. 4; in fact, that paragraph was the cause of the present series of papers being written, as we preferred this course to answering a number of disconnected questions.

In polishing the foot of the stud, care must be taken that the wood on which it rests is perfectly square; also to avoid rubbing it down over the hole. Use a broad polisher, and give it a circular motion; the same remarks apply to the top. The index is generally shellaced on to a piece of brass to polish the ball; if there is any difficulty in getting the shellac off, it should be immersed in methylated spirits, after which it comes away readily; the pins are put in before the arm is polished. Polish the settings of the jewellings on small corks obtained from medicine bottles; the diamond steel is blued. In polishing the bolt, care must be taken not to widen the notch which locks on the edge of the case, otherwise the frame will lift up and down; also the sides and bottom must be carefully dealt with, or the opening in the cap will be too wide; the bolt spring, click, ratchet, stop and spring are blued. Before the cannon pinion is hardened, take the burrs out of the teeth, it is almost impossible to do this afterwards; also see that the squares are not too high above the dial; in a hunter this is very important. The barrel and fusee may now be put together. It is usual to gild the cover so that it may correspond with the plates, but it will do equally well polished circular. Perhaps the most difficult operation to a learner is winding in the mainspring, as if it once gets a twist it is spoilt, and there is also a great risk of cutting the edge of the barrel. It is the rule to get the barrel flat and to mark the position of the cover before it is polished, and the spring should be made to run over that part of the edge which is opposite the notch in the cover. While winding, the centre of the spring must be firmly pressed down with the fore and middle fingers of the left hand, the thumb being on the bottom of the barrel; the handle of the spring tool is to the right. Put on the cover and try the freedom of the spring with the sliding tongs, having previously oiled the holes and put a little on the top of the spring. It will be found that the eye is generally broader than the other part, and the cover may have to be turned just by the boss, if this has not already been done in the "grey." The spring should make four turns and a quarter in the barrel.

With regard to the fusee, the chief point is to see that the clicks are free and the springs not stronger than necessary, also that the maintaining spring is not too strong. This is supposed to be tested by putting the adjusting rod on the square, after the fusee is put together, with the bob as it was in trying the adjustment of the watch in the grey, and the maintaining spring ought not to be able to resist it. If it is too weak the watch will not "go while winding," as still advertised in many shop windows; but this speciality is not particularly appreciated by the present generation of watch buyers, who expect it as a matter of course. Pinning the fusee up is an operation requiring some care. It is usual to pin it up quite tight, and then to strike the end of the pivot with a bone handled brush, so as to bend the pin and thus give freedom. Copper is used by some, but it is too soft; it is better to heat the piece of brass out of which the pin is made.

The chain should now be most carefully examined, link by link. It is extremely difficult to get a good chain, and the hooks often require changing. The chain ought to unwind off the fusee by the weight of the latter when held up by it. Always get one as strong as possible, but remember that no chain is stronger than its weakest part. This being done, the plates may be brought out. See, at the commencement, that they are square; if not, bend them. The pride of a finisher is to put a watch together without brushing the plates; but this cannot be expected in making everything quite right for going. Before putting the screws in, pass a peg damped with watch oil through the holes. The sinks for the jewellings will require carefully scraping with a polished cutter; there must be no shake in the necks of the holes. Examine the fit on the escapement pivots, and notice how much they come through; this knowledge may be useful afterwards. The brass holes must be round broached. The banking pins should be pushed a certain distance through the plate, the tops rounded off with a tool, and then pressed home; they ought to be straight and both one size. After trying the freedom and end shakes of the large train, put the escapement in by itself, and examine it very thoroughly. Sometimes the banking pin next the escape wheel is dangerously close, and must be shortened; this is a most difficult thing to do when the watch is together. Make sure, too, that the guard pin is not banking in the edge of the roller hole in the plate. After the escapement is seen to be right, the balance may be sent to be "cut." Next comes the motion work; this also includes seeing to the fitting in the case. The joint pin requires to fit "all through," and it is quite a scientific operation to make a good one. If the frame drops it is a mistake to keep on opening the hole, as the pin only gets larger without the required effect being produced. Take the frame out, and notice how far the pin comes through the brass joint; then it is easy to see whether it or the case knuckles should be opened. The shape of the pin has a great deal to do with it, and it should be a little short when driven home; also square at the end, to allow the joint pusher to act fairly on it in getting it out.

We must leave further details for our next.

The Tax on Manufactured Silver.

There is usually some miserable shred of misplaced argument at the disposal of officialism when it seeks to protract the death-throes of a doomed institution, but even this poor satisfaction is denied Mr. Childers in his effort to preserve his cherished tax on silver plate. From the point of view of the necessities of the revenue, the case of those who advocate the repeal of the tax has been effectually conceded by his own admission in his place in parliament. His only plea for the retention of the duty is that of the supposed difficulty of satisfying the existing holders of unused silver plate, who are supposed to claim a return of all the duty they have paid. But, as is most pertinently asked in an excellent pamphlet by Mr. C. M. Smith which has come under our notice and suggested these remarks to us, when was such an obstacle ever before allowed to prevail against the abolition of a tax? To the best of our knowledge and recollection, out of the five hundred items more or less which have been swept from the customs and excise tariff of this country during the last thirty years, the one solitary instance in which drawback was allowed on existing duty-paid stocks was in the case of the tax on paper. Those who held silks, tea, sugar, and hundreds of other articles of luxury or daily use, were allowed to console themselves as best they might on the abolition of the respective duties on these things, and we have no recollection of any of them seeking to pose as martyrs, or even as much as alleging that they had a grievance. Why then is it proposed that master silversmiths be exempt from the vicissitudes which beset other men? The question has an economic aspect, the gravity of which we would not seek to underrate. Our interest in it has to do with it from its artistic side. Without doubt the more eminent houses in the silversmiths' trade do turn out work of high excellence, but it is equally certain that both in design and workmanship, something on the wrong side of mediocrity is the prevailing note. Even the rich man is, *faute de mieux*, obliged to load his table with miserable patterns begotten of cobbler's wax and plaster of Paris, which the point of an honest graving-tool has never as much as grazed. There cannot be a doubt that the abolition of the silver tax would give a new impetus to the silver trade from its artistic side, and that work in real silver—work calculated to bring out the artisan's pride in his calling—would largely reoccupy the place now usurped by that silver varnish upon a baser metal familiar to us as electro-plate. The duty on manufactured gold stands on a different basis from that of silver. The first cost of gold, apart from any question of duty, is one which must at all times restrict its use in the artistic field to what we may almost term the upper five hundred. And, moreover, the economic reasons which lend support to the policy of driving silver into trade uses, so far as that can be done by the withdrawal of artificial restrictions upon these uses, operate in a contrary direction as regards the nobler metal.—*Art Journal.*

The Watchmaking Industry in Switzerland.

THE *Times* Geneva correspondent states that according to the report of the Swiss Industrial and Commercial Society for 1882, the watch trade of the Confederation has greatly improved during the last few years, and continues to be in a fairly satisfactory condition. In the year in question the importation of common clocks amounted to 1,164 metric quintals, being an increase of sixty-four quintals on the importation of 1881. The export for the same period augmented in almost equal measure. For fine clocks and watches the figures are reversed, in the sense that the exports greatly exceeded the imports. The Swiss really import neither one nor the other in appreciable quantities, albeit they sometimes import parts of watches for manufacturing purposes. Since 1878 exports of watches to the United States have largely increased. In that year they amounted in value to 4,000,000f.; in 1880, the amount was 10,000,000f.; in 1881, nearly 12,000,000f.; in 1882, 13,200,000f. The use of machinery in watchmaking becomes every year more general, and in a little while watchmaking by hand will be a thing of the past. American competition has doubtless done something to bring this change about; yet it should be remembered, for the credit of Swiss horologists, that they were the first to introduce machinery into their craft, and that the first American models and patterns were procured at Geneva. The report deplores the rejection of the Federal Patent Law (vetoed by the popular vote). While watchmaking was an art, pure and simple, the protection of horological inventions was a matter of secondary importance; but now that it has become an industry dependent for its success on the perfection of mechanical appliances, the absence of protection is an undoubted evil. The spirit of invention is not encouraged, and when an inventor conceives a new idea, or discovers an improved method of manufacture, he is apt to betake himself to countries where he can enjoy the safeguards which are denied him at home. Albeit the demand for watches during 1882 was large and active, production was equal to all the calls upon it, and home and foreign competition has hindered any proportionate rise in prices or addition to profits. France, despite protective duties and an extensive domestic production, continues to be one of Switzerland's best customers; but the trade with England, especially for certain sorts of watches, is not so good as it used to be. Trade with Germany, Austria, and Russia was much as usual in 1882, and calls for no special remark. Italy, on the other hand, seems to be wanting more watches; in 1882 more were taken, and if a more rational tariff were adopted, commerce with that country, as well in watches as in other merchandise, would largely increase. As touching watches, the Italian tariff appears rather designed to encourage fraud than to swell the revenue or protect native industry. The nature of the frontier between the two countries, moreover, renders it impossible to prevent extensive smuggling of articles so portable and valuable as watches and jewellery, and the volume of contraband trade is probably only a little less considerable than that of legitimate commerce. Trade with Belgium is now entirely free, the duty formerly imposed on watches having been lately repealed. Switzerland's most formidable competitors are the workshops of Besançon and the "puissant" watch factories of the United States. Besançon uses little machinery, but has the advantage of low-priced labour; while in the United States economy of manufacture is attained by the elaboration of mechanical appliances, long working days, and a vast production; but so active is the demand that nearly all this production, and the considerable supplies received from Switzerland, are absorbed by the home market. As many existing factories are about to be enlarged and new factories built, competition bids fair to be keener in the future than it has been in the past, and it will require all the energy and skill that Swiss horologists can command to enable them to maintain the position they have acquired.

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Birkbeck Literary and Scientific Institution.

Mr. I. Herrmann (Registered Teacher of the City and Guilds Institute) will deliver a course of lectures on Watch and Clock Making at the above Institution, on Tuesday evenings, from 9 to 10.15, commencing on the 2nd inst.

The syllabus includes the following subjects:—

Elementary.

Preliminary.—Geometrical definitions—Epicycloidal and Involute Curves—Decimals—Proportions—Force—Moment and Parallelogram of Forces—Friction—Capillary action—Lever—Inclined Plane.

Application.—Great Works of Clocks and Watches—Conditions of their arrangement—Mainspring; cause and result of breakage—Brace—Stopworks—Maintaining work.

Train.—Form of Teeth and Leaves—Proportions—Uniform lead—Calculations of Trains.

Escapements.—Relative properties and classifications—Dead beat and recoil—Clock Escapements—Length of Pallets—Angles of impulse and recoil—Pendulum—Timing—Method of Drawing and Construction.

Horizontal Escapement.—Size and form of Cylinder—Form of Teeth—Conditions of depth—Balance—Timing—Method of Drawing and Constructing.

Lever Escapement.—Wheel and Pallets—Impulse and Locking Planes—Depth—Lever and Roller—Guard action—Double Roller—Method of Drawing and Constructing.

Honours.

Preliminary.—Practical Trigonometry—Use of tables of natural and logarithmic sines, &c.—Logarithms of Numbers—Exercises—Uniform and accelerated motion—Falling bodies—Motion in a circle—About a fixed centre—Energy of a moving body—Impact.

Application.—Analysis of Escapements—Duplex—Chronometer—Remontoir—Gravity Escapements—Gearing—Exercises—Principles of simple Pendulum—Compound Pendulum—Compensation—Radius of oscillation—Exercises in length and time—Conical Pendulum.

Balance.—Mass—Moment of inertia—Radius of gyration—Exercises—Compensation—Balance Spring—Isochronism.

Similar instruction will be given by Mr. Herrmann on Monday and Wednesday evenings in connection with the Young Men's Christian Institute, meeting at the Polytechnic, Regent Street, commencing October 10th.

All needful information may be obtained from the Secretaries, or the Teacher.

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Needles and Pins.—One of the flourishing industries of Germany is that of the manufacture of needles and pins. The eight manufactories of Iserlohn alone consumed in 1882 no less than 600 tons of wire, employing 800 male and 700 female and juvenile workpeople, besides seven steam engines and four water-wheels of 230-horse power. A large export trade is thus maintained.

An Accurate and Cheap Micrometer.

Proof Extract from the "Uhrmacher-Kalender."

By M. Grossman.

DURING the series of years in which the construction of micrometers and other measuring instruments formed a part of my business, frequent complaints reached me as to their high price. Though the usual round micrometer appears, superficially, a very simple piece of mechanism, yet its construction is not equally simple and easy; because such work, if it is to be useful, requires careful execution. An instrument which is to indicate the hundredth part of a millimeter must be well made, otherwise it will be guilty of misrepresentation. I believe I have shown this by several examples in my "Notiz Kalender," p. 149, 1880. It has been my constant endeavour to introduce rational methods into the work of our trade, which are based on measurement and calculation, by which alone it can retain its indispensable alliance with science.

I saw with regret, therefore, that so many persevering workmen, in their struggles with the difficulties of their vocation, had to deny themselves the pleasure of the possession of a good micrometer. Hence, I offered to supply the materials to such as where without the means of getting one completed, or had not the inclination of making one. Many availed themselves of my offer, and thus the application of the micrometer has been greatly increased; and at the same time I reaped the satisfaction of receiving the acknowledgment of those who undertook the construction of such an instrument, that the work was not by any means so easy as it appeared at a casual estimation.

Nevertheless, the micrometer is a dear tool, and I have frequently thought over the problem, to construct an accurate micrometer at a more moderate price. It is likewise desirable to produce one that is less delicate in its construction, for very often micrometers are sent to me for repair, in which the claws are bent to such an extent as to make their replacement by new ones a necessity.

To obtain this result the most simple form must be adopted, and this consists in the use of claws of very short radius, whose movement is indicated by a long index, moving along a sufficiently large and graduated arc. To measure a moderate span with such short claws necessitates, however, a very large angular movement of the claws. But all instruments of this kind have the common fault, that they do not measure the arc which the claws describe, but the line of the arc. Although this fault exists in the ordinary round micrometer, yet since the opening does not exceed an angle of 8°, the error is unimportant; because for all practical purposes in watchwork, a line of 8° may be taken equal to the arc that subtends it. We get a marked difference, however, with larger angles; for with angles above that measure, the difference between the sine and arc increases with the angle. For example:—

An Angle of	Sine.	Arc.	Difference Per Cent.
5°	=0·0872	=0·0873	=0·1145
10°	=0·1743	=0·1745	=0·1146
15°	=0·2611	=0·2618	=0·2764
20°	=0·3473	=0·3491	=0·5156
30°	=0·5176	=0·5236	=1·441
40°	=0·6840	=0·6981	=2·02
50°	=0·8452	=0·8727	=3·15
60°	=1·	=1·0472	=4·51

It is evident, therefore, that no precise measurement can be obtained on the basis of a construction, which has natural inequality to the extent of 3 and more %. To make, therefore, a micrometer of the above simple description, it is first of all necessary to equalise the sine error.

After I had completed an isometrical division for my decimal gauge, which neutralised the "sine error" perfectly, I was enabled to increase the span from 10 mm. to 12½, whereby the angular measure was likewise increased from 36° to 45°.

(To be Continued.)

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Tangents of Trade Mark Law.

By C. Stuart Murray.

UPON the conclusion of my narrative in our last issue, of the case of Lecomber *versus* Hollins, I said something about my giving an "epitome" of the law relating to Trade Marks. Upon second thoughts, however—and even in "springing and timing" they are generally acted upon as the "adjusted ones"—I decided that Epitome was not the most suitable name. It is a compound Greek word, and in reality means a—well, if you told some one to epitomize he might bow and proceed, whereas if you exclaimed, "Cut it short," you would spoil the tempering altogether. I have, consequently, abandoned epitome, and have adopted "tangents," as in every way the more suitable, but chiefly on account of space. The closest epitome that I could give would occupy the whole of this journal, from title-page to colophon. On the other hand, "tangents," or "touchings," on the circumference of the circle of Trade Mark Law seems to me to be sufficient for our present purpose; unless, indeed, some thousand or so of subscribers should please to send their extra postal notes to the proprietor to have "a little more of it." There is no immediate hurry, as there will be ample time during the ensuing fortnight to go over the *pros* and *cons* of the question.

The general principles upon which the Courts act with regard to Trade Mark Law are those of stringent equity as between plaintiffs and defendants. For instance, it is laid down that a man is not to sell his own goods under the pretence that they are the goods of another man; he cannot be permitted to practise such a deception, nor to use the means which contribute to that end. We cannot, therefore, be allowed to use names, marks, letters, or other *indicia* by which he may induce purchasers to believe that the goods which he is selling are the manufacture of another person. The function of the mark is to give the purchaser a satisfactory assurance of the make and quality of the article that he is buying. The mark of the manufacturer from whom an article comes is the only indication to the eye of the customer of the quality of the article. So with any other thing. While the object of the mark is to indicate quality—and I wish to strongly impress the following words upon the reader—*a mere English adjective, or word in common use, which indicates quality and nothing more, not serving to connect the goods with any particular manufacturer, cannot be appropriated as a Trade Mark, for no one can be permitted to exclude others from the use of words common to all in their application to goods.* Marks, however, which serve to indicate the production of a certain manufacturer, though at the same time subject to variation for the purpose of denoting different qualities, are entitled to protection. A mere name for a natural product, which is open to all the world, cannot be exclusively appropriated by an individual, who possesses no exclusive access to it. A Trade Mark is beneficial to the public in enabling them to buy with confidence, and also to the manufacturer, since it affords him the means of securing the benefit of custom which he deserves and which is intended for him.

Let me now turn to the Trade Marks Registration Act itself. This Act was passed in the Session of 1875, and soon came into operation.

The first section provides that a Register of Trade Marks, as defined by this Act, and of the proprietors of such Marks, shall be established under the superintendence of the Commissioners of Patents, and from and after the 1st of July, 1876, a person shall not be entitled to institute any proceeding to prevent the infringement of any Trade Mark as defined by this Act, until and unless such Trade Mark is registered in pursuance of this Act. Under section 2, a Trade Mark must be registered as belonging to particular goods, or classes of goods; and when so registered shall be assigned and transmitted only in connexion with the goodwill of the business concerned in such particular goods or classes of goods, and shall be determinable with such goodwill, but subject as aforesaid. Registration of a Trade Mark shall be deemed to be equivalent to the public use of such Mark. In section 8, the registration of a person as first proprietor of a Trade Mark shall be evidence, on the first face of it, of his right to the exclusive use of such Trade Mark, and shall, after the expiration of five years from the date of such registration, be considered as conclusive evidence of his right to the exclusive use of such Trade Mark, subject to the provisions of this Act as to its connexion with the goodwill of a business. By section 4, it is laid down that every proprietor registered in respect to a Trade Mark subsequently to the first registered proprietor shall, as respects his title to that Trade Mark, stand in the same position as if his title were a continuation of the title of the first registered proprietor. The further sections have special provisions in reference to the Cutlers' Company and to Sheffield corporate marks, and also to provisions for the carrying out of the Act.

For the purposes of the present law, certain definitions have been laid down for future guidance; thus:—A Trade Mark is to consist of one or more of the following essential particulars. The name of an individual or of a firm either impressed or made upon the article in some peculiar and distinctive manner. The late Master of the Rolls laid it down that, in the case of an alleged infringement, the plaintiff has nothing to do but to show that the mark has been taken. In the case of a false representation, however, which does not amount to the infringement of a Trade Mark proper, "There, as in every other case of fraud—for it must be fraud—the case must be proved." That is to say; that in the first case the plaintiff has only to show by the exposure in court of goods *not* his own make with his mark upon them; whilst in the allegation of fraud, such fraud must be established according to legal requirement.

The following designs may be registered as Trade Marks.

A written signature, or copy of such, of an individual or firm. A distinctive device, mark, heading, label, or ticket. And there may be added to any one or more of the said particulars, any letters, words, or figures, or combinations of the same. Any special and distinctive word or words, or any combination of figures or letters used as a Trade Mark before the passing of this Act, may be registered as such under this Act. The effect of definition is to greatly restrict the variety of Trade Marks now capable of adoption for the first time by a manufacturer; for he would be unable to register or obtain protection under this Act for a new Trade Mark which does not comply with this definition by containing some one of the three first essential particulars, although previously to the Act it would have been perfectly good.

(To be Continued.)

Amber.

AMBER is the beautiful name of a beautiful substance, the origin of which, though long involved in mystery, has now been completely elucidated and made "as clear as amber" itself. Some Prussian botanists have been examining the formation on the Baltic shore whence this fossil gum is obtained, and not only have they distinguished the trees from which it once oozed, but they have referred each of the different varieties of the mineral to the individual species of pine or fir that originally produced it. From their researches it would appear that once upon a time the land which is now the Baltic Sea was a superb forest of conifers, some of them those giant-trees that are to-day the pride of California, others the cedars which still tower supreme in the East, together with the firs, spruce, and cypress of our own islands. Convulsions of nature, earthquakes and deluges, glacial and volcanic catastrophes have long ago sundered continent from continent, and thus the trees which once all grew together upon what is now the Baltic Sea are now as widely separated as the red-wood pine that overlooks the Pacific slope, and the cedars that darken Lebanon by the Levant, as the Scotch fir, the glory of the Highlands and the badge of the clans, and the African arbor-vitæ that gives the Hottentot his fire-wood, and the dwarf Bosjeman the wood for his bow. Yet, though thus scattered now, these plants once kept stately company together on the wind-blown ridges of the northern hills, in Niflheim, "the land of eternal winter," in the days before Asgard was, and while as yet there was no hammer in the hand of Thor. There and then, in an age of gloom and in the midst of the terrific processes by which Nature was preparing the world for coming races of conquering men, those grand old trees were piling up about their roots, for the mystery and delight of the future, the golden gum which we call amber. Wherever the storm had wrenched off a bough, or bird or animal or insect had wounded the bark, there distilled from the hurt, trickling down the bole or dripping out on to the ground beneath, the beautiful salving balsam that men for ages puzzled over, calling it the "tears of the sea-birds," or "sea-glass," "succinum," "the gum-stone," or "electron," a gift from the sun. But, whatever name they gave it, all the nations of antiquity delighted in it, wondering at its beauty, and imagining in it strange mystical properties. Nor in modern times, though we have found out the secret of the exquisite object, has admiration lessened. Indeed, the researches into its origin have revealed new beauties in it; and, while displacing the tender superstitions of the ancients, have invested this fascinating and suggestive antiquity with higher claims to a more rational interest. It is no longer the tears which the Electrides, transformed as poplars upon the banks of Eridamus, shed for the fate of their brother Phaeton; but it is a legacy of great value and surpassing beauty, bequeathed to these latter days by the splendid forests of a perished continent.

The value of amber, familiarised as the substance is in "smokers' requisites," is far greater than the majority imagine. Small pieces of indifferent quality suffice for the mouthpieces of pipes and for isolated ornaments; and—though the prices charged for even such specimens as these are far above their actual worth—they are comparatively cheap. In necklaces, however, where every bead has exactly to match its fellow, or in the larger articles, requiring to be cut from a single piece of considerable size, the cost and real worth of the fossil gum rises so rapidly that in certain cases it deserves, if the money charged for it be any criterion, to rank with the "precious" minerals, and many pieces of amber in the rough state are worth more than their bulk in gold. Yet even this does not approach by a long way the esteem in which antiquity held their electron; for not only was amber the oldest of gems, and therefore, in a measure, magnified by traditional reputation, but it was supposed to possess amazing occult properties. It was worn all over Northern Italy as a preventive of goître, just as it is worn to day by the people of Arabia as a talisman against the evil eye. More powerful than sorcery and witchcraft, it was an amulet that made poisons harmless; ground up with honey and oil of roses it was a specific for deafness, and with Attic honey for dimness of sight. Nor is this claim of medicinal virtue altogether without foundation in fact, for "its efficacy as a defence of the throat against chills"—owing probably to "the extreme warmth when in contact with the skin, and the circle of electricity so maintained"—has been tested and substantiated. The ancients, however, were not content with mystic curative powers in the solid substance, for they ascribed valuable properties to it in combustion, admiring the perfume that resulted, not only for its resinous fragrance, but for its healthiness, thereby innocently detecting in the fossil pine-gum the same virtues that modern physic attributes to the living pine-trees. In many parts of the East, especially in China, where prodigious quantities of Prussian amber are consumed, this substance is preferred to all others for incense; and thus the Buddhist shrines in the palaces of Pekin and the holy places of Mohammedan Mecca alike owe the fragrance of pious fumes to the same strange, beautiful source, the dead fir forests of a pre-historic Europe. Nevertheless, the chief charm both for the past and the present lies in the positive beauty of the mineral. It is the only gum specified in Homer, and the earliest specimens of Etruscan jewellery are carved fragments of the "lynx-stone"—for among other quaint surmises as to its origin was one that supposed it to be a product of the lynx, just as the eagle had its ætites, the toad its bufonite, the cock its electryon, the kingfisher its halcyonite, the swallow its chelidone, and other beasts and birds their appropriate minerals, either carried about in their heads or other parts of their bodies, or distilled upon occasion. Has not the snake to this day a jewel in its skull in all superstitions; and, in the East, does not the horse possess the yedh, that wonderful stone which, properly used, can call down rain from the clouds? That the lynx should produce amber was, therefore, not more wonderful than that the whale, as it really does, should produce ambergris. Every writer of antiquity, however, who refers to it always gives amber, by whatever name he may call it, the place of honour as the most beautiful gem in his catalogue, and the supreme ornament of princesses or heroes. Nero, the enthusiast in perfumes, music, and gems, possessed so much that on one occasion all the weapons and articles used in the amphitheatre were made of it, and the ropes round the arena were hung with balls and lumps of it; and, so sensitive was that dainty monster of the beauty of the thing, that, singing the charms of his Poppœa, he calls her hair amber-coloured. Yet this does not of itself prove, as some suppose, that Poppœa was a blonde; for, apart from the fact that the Roman ladies of Nero's time bleached their hair to the same tints of tow that modern fashion has familiarised, amber, as known to the Romans, varied from primrose to black. Not only is the charming fossil found ranging through all the shades of yellow to fulvous auburn and the strange mixed colours of jasper, but it deepens into such dark browns and vinous purples as almost to rival the hue of jet. Poppœa, therefore, in spite of her "amber" hair, may have been as dark as Cleopatra or Judith; but it is in evidence of Nero's taste that he applied the exquisite epithet to the most exquisite of a woman's ornaments—her hair.

Nor in the choice of things of beauty can woman's judgment be gainsaid. As Darwin has shown, we owe nearly all that is most charming in animal nature to the preferences of the sex. And she has dignified amber with her approval from the earliest times. Go where the traveller may—in Europe or Asia and some parts of Africa—he will find the "gum-stone" among the precious possessions of women. What an inordinate value the Arabs' wives in Aden attach to those translucent lumps of amber which they wear round their necks! Their clothes, their babies, even their hair may be bought; but only a large bribe, far more than the market value of the uncouth though splendid beads, or the fear of the thick staff of their avaricious and fiercely-beaded spouses, will persuade them to unthread that magic necklace. High up in the Himalayas, again, irregular pieces of clouded amber are found as the central ornaments of the wondrous tiaras and cinglets which the hill-dames wear, richly set in turquoise-studded silver. In Europe, female fashion, always tending towards the rarest, has left amber behind; but science, for the sake of the relics of an old world that the fossil often contains, has largely replaced fashion, while, in spite of all the imitations that copals, Australian gums, or chemistry can devise, the true substance is annually finding a larger range in the service of the smoker. To the practical mind of the nineteenth century it commends itself for the purpose from its peculiar combination of a certain elasticity between the teeth with hardness and cleanliness. It really, however, owes its origin as the chosen material for the pipe to the tradition of its resisting the influences of contagion. For in the East, where it was first used for this purpose, the pipe is a social symbol, and, like the "loving-cup," is passed round from mouth to mouth; so the special property of amber, that it could not suffer contamination, was all-important. Again, how easily a traitor might have poisoned a guest, had not the mouthpiece been a certain prophylactic against all secret venoms! Thus, even in our modern usage of the material, we perpetuate a superstition; and, though the science of to-day has told us all the secrets of those dead pine-forests, the cedars and the cypresses that lie under the waves of the Baltic Sea, we cannot, if we would, separate our own preferences altogether from those of the past, when the world spoke, as of a mystic race, of the Æstyi, "the amber-gatheres," and, as of a myth, of the northern seas where the golden lumps floated on to the shore "in the first moon of the Spring." Nor does it in any way detract from intelligent interest in the beautiful product to know that once upon a time the very beads we see worn in our streets dripped from the giant firs that clothed the Northland hills, nor from the pipe mouthpiece of to-day to cast a backward thought to the bygone ages when, in the shadowy land of Odin, those old trees stood there, in vigorous phalanx, embossed and belted with amber.—*Daily Telegraph.*

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A Bell Chiming and Change Ringing Machine, invented and fitted up by Messrs. J. Shaw, Son & Co., Church Clock Makers, Bradford, has been placed in the tower of Hunslet Church, Leeds, the Vicar being the first to use the machine. There are eight bells in the tower, the largest weighing 21 cwts. The hammers worked by the machine average in weight 30 to 60 lbs. The ringing was pronounced by all who heard it, to be melodious and pleasing. The machine, christened "The Churchwarden's Friend," has three distinct motions, and can be used for cannoning, change ringing, and chiming in; these changes being readily effected. It only occupies a space three feet square, is compact in form, strongly made, and the construction is such that a boy, or an unskilled person, can work it with ease. When at rest the connection with the bells can be thrown out of gear, the hammers being raised, and the bells can be rung in the ordinary way. The machine does all that is required for Service ringing. We understand the machine can be made to lift any weight of hammers, and to suit any number of bells.

Keyless Work for Application to Key-winding Watches.

An Interesting Novelty in Watchmaking.

FOR converting key-winding into keyless watches, a new Stem-winding Device, which has been patented by Mr. Henry Abbott, watch manufacturer in New York, and successfully introduced into America, is well deserving the attention of watchmakers, who have but few facilities of changing watches from key to stem-winders.

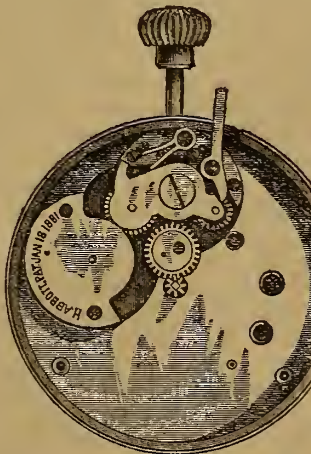
The parts are made by the same style of machinery as that used in the American watch factories, and are interchangeable, and are all finished and fitted to each other in such a manner that *the winding device is attached to the watch* by a single operation, instead of fitting the parts one at a time, as is done in all methods in use heretofore.

This new stem-winding device has been so favourably received and approved of by the leading watchmakers in America, that since its introduction more than 5000 watches have been converted by its adaptation from key-winding to keyless, and will prove a novel, interesting, and lucrative part of occupation of any working watchmaker.

The *depth* or *pitch* of the wheels is effected by a very simple and original mode of adjustment which requires no skill whatever, and the device can be applied to a watch by any watchmaker or repairer of ordinary ability; the *ratchet-wheel, bridge, click, and click-spring,* that accompany the stem-winding device are made in a compact manner, and fitted to the watch-plate in a single turning, that is, concentric with the *barrel-arbor.*

The stem is made sufficiently small to allow it to pass through the neck of almost any pendant that is made, and the *crown* is of the proper shape to fit around the pendant, so that it will very seldom be necessary to send the case to a case-maker for alteration.

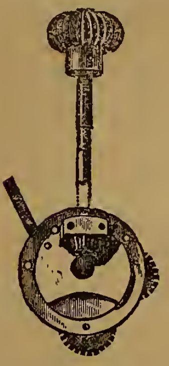
This winding device will, without any alteration, fit any of the American *full-plate* watches, and it may be modified so as to apply to a great many different kinds of watches. Full directions for fitting the American watches accompany each set of material. For fitting other watches the watchmaker must of necessity exercise his own judgment, as it would be impossible to make rules that would apply to every watch or case.

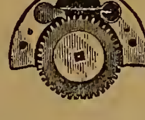


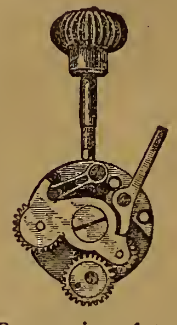
View of stem-winder and ratchet-bridge on the watch-plate under dial of ordinary American watch.

In consideration of the universally acknowledged superiority of keyless watches, the introduction of this new stem-winding device opens a somewhat extensive field in every country for the conversion of a large number of good key-winding into keyless watches.

A common Swiss Universal Lathe is all that is necessary to make the proper turnings for fitting.


Top view of stem-winder, connected with motion wheels.


Bottom view of bridge for covering the ratchet.


Bottom view of stem-winder.

The above engravings represent clearly the device applied to an ordinary American watch. With watches of different caliper, of course, some modification may be desirable. The following directions issued by Mr. Hy. Abbott (patentee), of New York, will no doubt be sufficient guide for most watchmakers:—

"First strip the pillar-plate of all movable parts. Mark the edge of the plate directly under the figure III. on the dial, and draw a straight line from this point to the centre. Set the points of the depthing tool or dividers the same distance apart as the two prick marks on the bottom of the ratchet bridge; then place one of the points in the centre hole of the pillar-plate, and mark part of a circle across the straight line previously drawn. At the point where these lines intersect each other, drill a small hole. Centre the plate from this hole, in the Universal lathe, and turn a hole completely through the plate that will just fit the hub or bottom part of the brass plate to which the winding parts are attached. Then, without removing the plate from the lathe, turn a bearing for the flanged part of the small plate, deep enough, so that the hub of the small plate will come just flush with the bottom of the pillar-plate. If the third hole jewel is so large as to interfere with these turnings, remove the jewel and setting and reset a smaller jewel in a new setting, before making the first turning in the plate.

"Remove the pillar-plate and re-centre it from the barrel arbor hole. From this point make a turning to fit the ratchet bridge, deep enough to clear the dial and make the end shake of the arbor correct, which will usually be at about the same depth as the former turning. Care should be taken to make a close fit in the diameter of this turning. Also see that the ratchet wheel turns free under the bridge. Recentre the pillar-plate in the lathe, so as to cut off the corner between the two turnings already made, enough to clear the wheel under the yoke, as shown in the first figure. Secure the ratchet bridge and the plate containing the winding parts of the pillar-plate in the recesses prepared for them by two screws each—care being taken that the latter is placed so that the stem will stand in a straight line from the centre of the watch. Move the eccentric hub over the setting wheel forward until the depth is correct with the canon pinion, then fasten it in position by putting a pin through it into the plate. With a square file cut an opening in the edge of the plate for the setting lever to work in, and with a round file cut a groove across the bottom edge of the pillar-plate to free the stem. Cut off part of the square on the top of the canon pinion, drill a small hole through the centre arbor above it, and put a pin through to prevent the pinion working off while setting the hands. Make the canon pinion turn smooth and easy. Remove the snap spring from the case, and either broach or file the hole through the pendant until the stem will pass through it and into the movement without binding on either side. If the stem in the movement does not come in line with the pendant of the case, cut off the steady pin from the movement and put in a new one. Soften the end of snap spring, and drill a hole in it for the stem to pass through. Cut off the stem to the proper length to make it push the case spring, after which the stem should be tempered. Secure the stem and crown in the case by a screw through the pendant. Cut off the end of the setting lever, so that the case will just shut over it. Make an opening through the bezel and centre of the case for it to work in, and the job of fitting is completed. If the work is carefully done, the watch will wind as smooth and easy, and will be as strong as any stem winding watch in the market.

"In an Illinois Company's watch the pallet arbor jewel occupies about the same position as the third jewel in other American watches, and it is usually advisable to shorten the pallet arbor from the lower end, and raise the hole jewel in its setting, or a new one, to meet it, before proceeding with the turnings in the pillar-plate as above.

"In a Hampden watch the barrel arbor has no square on its lower end, and may be reversed by bushing the barrel bridge and inserting a new hook, or a new arbor may be substituted.

"A Crescent Street watch requires the winding plate to be sunk a little lower than flush with the surface of the pillar-plate. It also requires a larger ratchet wheel than that used in the regular winder, and should be let into the pillar-plate inside, directly under the barrel, thus dispensing with the ratchet bridge. When a winder for a Crescent Street watch is wanted, it should be ordered specially.

"In a United States or Marion watch the ratchet wheel can be used without the bridge in the same manner as above.

"These directions are the result of our experience in fitting several hundred of the winders, and are intended to *assist* the workman, not to be substituted for his better judgment. It is not taken for granted that the workman, in fitting these winders to watches, is a mere machine who must follow printed directions blindly and regardless of consequences, but is expected that the same amount of judgment and discretion will be exercised in each case as would be in an ordinary job of watch repairing.

"In every case where any doubt exists in the mind of the workman, careful measurements should be made with dividers or depthing tool before proceeding with the work."

All particulars of information concerning this device may be obtained of H. Bush, Jewellers' Agent, Hessle Road, Hull.

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Chief Constable Farndale, of Birmingham, recently received a consignment of damaged jewellery, which has since been identified as part of the stock stolen a few months ago from Messrs. Mole and Sons, of Birmingham, valued at between £5,000 and £6,000. During some dredging operations in the Mersey a parcel was dragged up and found to contain broken watch movements, rims of lockets, and various other remains of valuable jewellery. The watch movements bore the name of Mole, Birmingham. They were despatched by the chief of the Liverpool detective department to Mr. Farndale, and they were identified by Mr. Mole as part of his stolen property. The thieves had taken away the precious stones and gold and silver, and thrown the less valuable material into the river, so as to leave no means of identification.

Trade Notes.

In the Birmingham Court of Bankruptcy, Thomas Patrick Leighton and William Edward Leighton, watch and clock material manufacturers, 21, Snow Hill, Birmingham, and of 135, Spon Street, Coventry, trading in co-partnership under the style or firm of T. Leighton and Son, filed their petition for liquidation, with liabilities estimated at £3,800, a large portion of which is fully secured, and assets considerable, but not yet ascertained.

An extraordinary pearl has been found at Nichol Bay. It is composed of nine distinct pearls about the size of peas, of a fine lustre, and firmly bedded together in the form of a perfect cross. It was found in the shell exactly as it now appears. The cross is about an inch and a half long. It is a perfectly unique curiosity, and is expected (says the Melbourne *Argus*) to fetch a fabulous price, owing to the extraordinary coincidence of its perfectly representing the symbol of Christianity.

We are compelled to hold over the review of the rates of the chronometers, lately on trial at the Royal Observatory, until our next issue. Some of our readers will probably have noticed that a complete list of names appeared last month in a contemporary, and will readily credit us with being in possession of the same information; but we refrained from publishing it, for two reasons; the first being, that it is not supposed to be public property until the printed lists are officially issued from the Observatory; and the second, that without explanation it is unfair to those makers who are at the bottom, the fact being that the mainsprings of the last two chronometers broke at an early period of the trial.

The Official report of the Director of the Observatory in Yale College, U.S., owing to some unexplained cause, did not reach us in time to notice last month. We note that the duration of the first-class trials for watch movements is forty-two days, during which they are tested in five positions, and in the oven and refrigerator. A lever watch of Mr. Schoof's, with resilient attachment, similar to the marine timepiece lately on trial at Greenwich, is fortunate in obtaining a first-class certificate, although its position is low on the list, the adjustment for compensation being imperfect.

The Court of Assistants of the Clockmakers' Company will meet for the transaction of business in a few days, when they will probably endeavour to solve the knotty problem presented to them, as to the disposal or non-disposal of their prizes. We have been spending some time in the study of their fourth condition, which stipulates that the successful chronometers shall have been in the possession of the claimants for at least six months previous to the trial, and also that the name and number shall have been legibly engraved on the upper plate as well as on the dial. As we understand it, this is to prevent a chronometer being purchased and re-named at the expiration of a trial, in order that its new owner may stand a chance of selling it to the Government next time. The result of the trial is not known to competitors until the middle of August, and the chronometers are not removed until September; consequently, only four months intervene between one trial and the next. It is felt by some that it is a hardship to be compelled to engrave the name on the top plate, as it is more difficult to remove it from there than from the dial; but "makers to the Admiralty" ought to be prepared to keep a few special instruments on hand, with their own names on.

Mr. Porter Rhodes, the fortunate owner of the priceless diamond that bears his name, is at present in Paris, awaiting the result of a competition between two millionaires desirous of possessing the jewel. The stone was found in his mine at Kimberley, South Africa, in the beginning of 1880, and made a great sensation among the diggers when the discovery was made known about four months later. Mr. Porter Rhodes was obliged to satisfy their curiosity by exhibiting the diamond. Accordingly, he placed it in a friend's office, charging a sovereign for admission, and in this way received £100 within the first two hours. Altogether he made by the exhibition £500, which he gave to the local hospital. On his arrival in England he was honoured with an invitation to Osborne, in order that her Majesty might inspect the stone. He was afterwards taken to Osborne Cottage, and had an interview with the Empress Eugenie. Mr. Porter Rhodes considers that his diamond as far surpasses the Kohinoor in purity as it does in weight, the Indian stone weighing 106½ carats, the Cape diamond about 150 carats. He said to his interviewer, "I shall at least have fulfilled one mission—I shall have convinced the world that the Cape diamonds are as radiantly pure and blue-white as the Dresden drop and the Braganza. I shall thus upset one popular delusion."

The usual half-yearly meeting of the subscribers of the Goldsmiths' and Jewellers' Annuity and Asylum Institution was held on the 30th August at the Horological Institute, Northampton Square. The chair, in the absence of the President, Mr. Geo. Lambert, was occupied by Mr. C. H. Secker. Four male and two female annuitants were elected, and one male inmate for the Asylum.

We extract the following from a New York letter:—"Tiffany, the great New York jeweller and silversmith, is building a palatial residence in Fifth Avenue, opposite the Park. I think it will be one of the show houses of the city when finished."

A large set of chimes have just been erected in Leyland Church, Lancashire, by Messrs. John Smith & Sons, Queen Street, Derby.

Magnetised Watches.—Some little time since, a pocket chronometer was returned by its owner for bad performance. On examination, it was discovered to be highly magnetised, especially the case springs, which on being placed in steel filings speedily became covered with them. The owner, after being informed of this, wrote as follows:—"I cannot understand how my chronometer can have become magnetised. I have never touched it with a magnet, though I am in the habit of using a magnet two or three times a day to set a registering thermometer. I have also an electric hair brush, which I keep in a box, inside the top drawer of my chest of drawers. It is very powerful, and affects a magnet through the thickness of a solid table, and I have been accustomed at night to keep my watch on the *top* of the drawers in a watch stand. I hardly think the magnetic influence can have extended so far."—A few years previously, we had to deal with a similar case, only the cause was more easily ascertained, inasmuch as the owner said he had been stopping the balance with a magnet, for the amusement and instruction of his children. Both watches went slow hanging, and after being repeatedly brought to time, still continued to lose; the arms of the balances seemed to retard the action of the springs, and so neutralised any attempt to correct the position error. Ultimately, the balances were taken off and blued, and new springs applied. It is scarcely likely that the magnet experiment would often be performed, but electric hair brushes are extensively used, and we have therefore recorded the incident

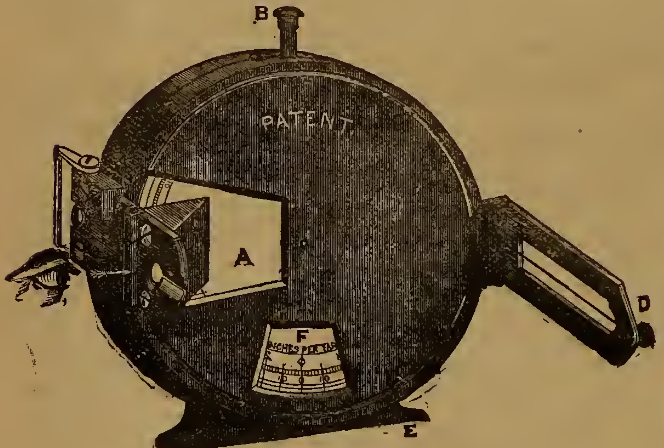
Combined Altitude Instrument and Prismatic Compass.

With this Instrument, patented in this Country and abroad by Messrs. Barker and Sons, of 12, Clerkenwell Road, London, E.C., Altitudes, Levels, Horizontal Angles, Compass Bearings, and rise and fall of any surface in degrees or inches per yard can be obtained with accuracy and despatch.

This form of the Patent Altitude and Prismatic Compass is of the same shape, size, and depth, as an ordinary Hutchinson Prismatic, and exceeds it but very trifling in weight. The diameters of the Compass Dial and Altitude Circle are both 2½ inches, Prismatic Compass Dial being divided into half degrees and Altitude Circle in same manner, which circle has also a scale of rise and fall in inches per yard for use with the foot E.

This portable instrument will be found very valuable both to civil and military surveyors on account of its compactness, accuracy, and readiness for use; for in changing from use as a prismatic compass to an instrument for obtaining vertical angles, levels, or rise and fall, there are no parts to remove or adjustments to make. The accuracy of a Prismatic Compass is well known, and in this instrument the altitude circle, which is an accurately balanced weighted disc, will be found to give satisfaction, as in the construction there are no parts with which fair usage can get out of order. The instrument can also be had fitted with azimuth glasses, so that the sun's altitude and bearings can be found.

For greater portability this instrument is also made in a hunting case, which will be found most useful, as it can be carried in the pocket without any case.



For taking vertical angles or levels, hold the instrument as in the illustration, pulling stop B well out, which will release the weighted disc A, after which focus prism C so as to read the divided circle distinctly, raise sight vane D and bisect with cross hair the object you wish to observe. The reading then shown through the prism will be correct reading, or if zero be shown the object will be on a level with the observer.

For use as a prismatic compass for horizontal angles, change instrument from a vertical to a horizontal position; in changing, let the section G of the disc fall opposite the prism box C, then push the stop-piece B in, so as to keep disc from moving, and proceed as with ordinary prismatic compass.

When the Instrument is not in use, the stop-piece should always be kept pushed in.

Index to Antique Rings and Ornaments.

100—Represents a curious Venetian ring, on the face of which is a representation of St. Mark, seated, giving the benediction.

101—A ring of the same construction, richly engraved and set with two rubies and a pyramidal diamond; the collett, holding the latter stone, opens with a spring, and exhibits a receptacle for such poisons as were concocted by Italian chemists in the 16th and 17th centuries.

102-3—These specimens are to be seen in the South Kensington Museum, where they are there described as English works of the 17th and 18th centuries, and appear to have been used as guards or keepers to the wedding ring.

104-5-6—Figure 104, to be seen in the British Museum, from whence we obtain the two specimens beside it, being such as worn by the humbler classes. Figure 104 is of brass, and Figs. 105, 106 of silver, the latter boasting some sort of apology for a jewelled centre.

107—A signet ring, the face of which is engraved with a coat of arms. At the sides two cupidons repose amid scroll-work, partaking of the taste of Renaissance.

108—Of excellent design, having a central arch of five stones in separate settings, held by the heads and outstretched wings of Chimeras, whose breasts are also jewelled.

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Taxation of Gold and Silver Plate.—This subject will be discussed at the meeting of the Social Science Association, at Huddersfield, on Tuesday the 9th instant. Mr. C. M. Smith, of 67, Cornhill, will read a paper on the question of taxation, with special reference to the depreciation in the price of silver, and the fall in value of the Indian Rupee; and Mr. Edward J. Watherston will follow with a paper, entitled, "Should Hall-Marking be maintained as a compulsory institution?" Both papers advocate complete freedom of the trades in the precious metals. In our November number we hope to publish full abstracts of both essays, together with the discussion which may follow their reading.

Shrievalty Preparations.—The official chains to be worn by the newly-elected Sheriffs of London and Middlesex were completed by Messrs. Edward and Son, of the Poultry. Although the designs are different, each of the chains, when complete, is endless, this being intended to symbolise perpetuity; both are of massive gold. That for Mr. Clarence Smith is forty-eight inches in length, and somewhat resembles that worn by Mr. Sheriff Savory during his year of office; it is of the tendril pattern. The chain made for Lieutenant-Colonel Cowan is eight inches less in length than that of his colleague, and consists of a series of long bevelled tablets. The badge which accompanies the second chain is also designed and manufactured by Messrs. Edward and Son. It is of 22-carat and 18-carat gold, beautifully enamelled in the heraldic colours, and of very handsome design. Its form is made in harmony with the chain, showing a broken oblong, the combined arms which it bears constituting a cross. In the centre are the arms of Lieutenant-Colonel Cowan, surmounted with the crest, the helmet being rendered in platinum. To the right are the arms of the City, on the left those of Middlesex, while there appear below the arms of the Broderers' Company. The background is of pierced scroll-work, with a wreath of laurel running round the edge.

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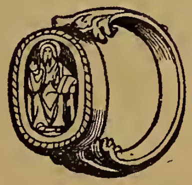
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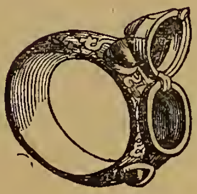
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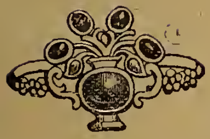
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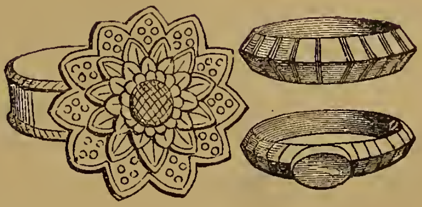
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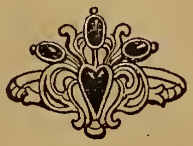
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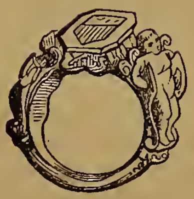
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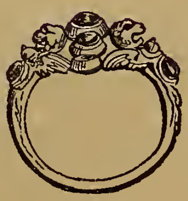
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For Description, see page 60.

THE WATCHMAKER JEWELLER AND SILVERSMITH

EDITED BY JAMES U. POOLE.

Entered at Stationers' Hall. Registered for Transmission Abroad.

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ILLUSTRATED SUPPLEMENT:—Design for a Cup.

The Worthies of Horology.

By C. Stuart Murray.

XVII.

THE CLOCKMAKERS' COMPANY.

Fourth Part.

DAVID RAMSEY, as has been previously stated, was the first Master of the Company, and was otherwise the most prominent member of the arts horological at that time in England as well. As is pretty generally known, all our kings and queens have had their housekeeping accounts preserved; and in such accounts we now and then pick up some interesting bits of information. For instance: in the reign of James the First, amongst some state papers of the year 1622, there is a pay-warrant, or order to pay to David Ramsey, the clockmaker to the king, the sum of £232 15s., for cleaning and repairing clocks at the several palaces of Theobalds, Oatlands, and Westminster; and for making a chime of bells adjoining to the clock at Theobalds. Upon the death of James the Second, Charles the First came to the throne, and Ramsey was re-appointed the king's clockmaker. The Clockmakers' Company had not been "chartered" then, but when it was, in 1631, there can be very little doubt but that Ramsey's position at Court had much to do with his having been chosen as the first Master. With respect to Theobalds, there is a historical note that partakes of the romantic connected with it, a portion of which reaches down to our own time.

Theobalds is near Waltham Cross, in the parish of Cheshunt, Hertfordshire, and was one of the mansions of Cecil, Lord Burghley, who was lord-treasurer to Queen Elizabeth. He had other dwellings besides his town house, upon whose site Exeter Hall now stands. It has been stated, upon very reliable authority, that it required forty thousand pounds a year of our present money to keep Lord Burghley's numerous establishments going! This Baron Burghley was the founder of the families embracing the Marquis of Salisbury and the Earl of Exeter. The gardens of Theobalds were, at one time, two miles in length, Lord Burghley being very fond himself of gardening. He often entertained Queen Elizabeth at the place, and, in fact, had it enlarged to suit her better convenience. It may be noted that when "Good Queen Bess" went on "friendly" visits to her ministers, she did not usually travel alone. She was twelve times at Theobalds with all her train from London, and they sometimes stayed three weeks or a month, and upon one occasion six weeks, with all their horses and baggage, the cost of which has been put down at about £2000 a week. Thus saith the old chronicler:—"Her Majesty sometimes had also strangers and ambassadors come to see her at Theobalds, where she hath been seen in as great royalty, and served as bountifully and magnificently as at any other time or place, all at his lordship's charge; with rich shows, pleasant devices, and all manner of sports that could be devised, to the great delight of Her Majesty and her whole train, with great thanks of all who partook of it, and as great commendation from all that heard of it abroad."

Although Lord Burghley basked in the sunshine of Queen Elizabeth for forty years, and holding for a long time, as lord-treasurer, the greatest money-making office of the State, the rental of his property did not exceed £20,000 a year of our present value. He was the founder of two families. The oldest of his two sons, by his first wife, was created Earl of Exeter, whilst his son Robert, by his second wife, became Earl of Salisbury. James the First went to Theobalds, and was so "taken" with its many beauties that he effected an exchange of Hatfield for it with its noble owner, the then Earl of Salisbury. Our Horological Worthy, Master Ramsey, when winding and repairing the clocks at Theobalds, was actually moving and having his being among the elements and people that were making the history of England. He would most probably, also, have wound up the clocks at Hatfield House, it having been a royal residence, as will presently be explained, before it became the property of the Earls of Salisbury; the Marquisate dates from the year 1789. I may mention that Theobalds was destroyed by the rebellious soldiers during the time of the Civil War, and, as far as I have been able to learn, it has never been restored.

Hatfield is a very ancient home, and has had a chequered career. The gossip of history goes on to say that the bishops of Ely had it as a palace at one time, with its adjoining manor, and at the dissolution of the monasteries it was made over to Henry the Eighth. His son, Edward the Sixth, lived in it until he became king; and afterwards his sister, the Princess Elizabeth, dwelt there until she became "Good Queen Bess." Her sister, Mary, treated her very much like "a prisoner at large," and when Mary died, the princess, of course, became sovereign. The oak is still pointed out under whose shade she is said to have been seated reading when the news was brought to her of Mary's demise. That was in the latter part of November, 1588; in considering the time of the year, she must have had a pretty warm skin to be seated reading out of doors under a tree. And this is the more remarkable when we know what the last week of November is like now. To be sure, Fahrenheit and his thermometer had not then entered the world to show us what the variations of the temperature were, so that the clerk of the weather, in the sixteenth century, was able to knock that weather about pretty much as he liked, there being no thermometers to go on somewhat in a seasonable manner. Elizabeth's first privy-council was held in Hatfield House. The present mansion, however, dates from 1611, so that we must fall back upon the poetic memory to call up the ancient scenes and people.

In some further accounts of the Court in 1612 is an entry:—"Watches, three bought of Mr. Ramsey, the clockmaker, lxj li," (61L). This, according to the present value of money, would represent about £300.

David Ramsey kept very royal company in his day. He was the companion of George Heriot, "Jingling Geordie," of the king's private circle. Geordie was much given to working at the bench, and became "eminent" in the language of the time. Furthermore, he was the king's jeweller and goldsmith, and became sufficiently rich to found hospitals in Edinburgh. He died in 1623, aged sixty-three, and his likeness is preserved in an engraved portrait, after a painting by Scougal, the engraving by Esplens.

It is related that another Horological Worthy, named William Bunting, a member of the Company, made a watch for John Milton, the construction of which would not disgrace the art horological of the present day. There were the days of the month and the usual time figures. Upon the dial was the inscription, "Ioanni Miltoni, 1631." The dial is covered by a glass. As the author of *Paradise Lost* was Oliver Cromwell's Latin Secretary during the time of the Commonwealth, the great Lord Protector must have often looked upon that production of the skill of Mr. Bunting. Watches are extant that have been made by other early members of the Company. There is one by John Midnall, one of the first assistants, and Robert Grinkin, who was among the first freemen. David Bouquet was another of the freemen, a specimen of whose handicraft has survived. There is a watch in the British Museum, said and believed to have belonged to Cromwell, that was made by Grinkin. Another member of the Company, Josiah Aspinwall, made a watch that was destined to sleep away from human eyes for a very long period. The story is taken from the proceedings of the Archæological Institute, of some twenty years ago. I take the details from Wright's *Curiosities*, with an explanatory note where requisite.

Lord Torpichen, of Calder House, Midlothian, exhibited at a meeting of the Institute a singular-looking clock-watch, that, of course, in keeping with its character of clock, struck the hours, and showed skilful construction. The name of the maker was Samuel Aspinwall, which name is almost looked upon as an error for that of Josiah Aspinwall, who was known in the trade, whilst that of Samuel was not. This watch had been secreted, along with other articles of value, in an old cabinet in the family mansion for more than a hundred years. The outer-case was of steel, wrought in open work, studded with silver. It was highly ornamented, among the details being an eagle, a rose, and a lily. The dial was a beautifully engraved silver one, the art-work being in the form of a picture, namely: Susannah being Accused by the Elders. As Mr. Wright says, there was only an hour hand; the hours being struck on a finely-toned bell, serving as an inner case within the open-work. The inner case was also open-wrought. The instrument measured about two-and-a-half inches in diameter, by one inch in thickness. There were two seals attached, one of steel and one of jasper, cut with the armorial bearings of the Sandilands, the family name of the Torpichen title. The date of the watch was about 1650 or 1660. It was quite in the fashion of the style of ornamentation of Charles the First's time. There was a balance-spring, or hair-spring, and a regulator, together with an admirably made chain, which it was thought had, at some later time, replaced the original catgut.

I now come to particulars of another Horological Worthy, namely, Edward East, one of the assistants at the incorporation of the Company in 1631. He made an alarm clock-watch, "royally mounted," in silver case, for king Charles the First, which the king used as a bedside watch, and was greatly attached to it. When, on his way to the scaffold, at Whitehall, upon January the 30th, 1649, he presented it to Sir Thomas Herbert. It afterwards came into the possession of Mr. Mitford, a member of the Archæological Institute, by an inter-marriage with the Herbert family, about a hundred and thirty years ago, where it is now. Unfortunately for horological archæology, part of the movement was modernised with the modern characteristics of sixty years ago, the original catgut having been replaced by a chain. The outer case was in fine perforated work, and the hours and quarters were chimed upon the original pair of silver bells. Mr. East gave the sum of £100, by deed of settlement to the Company in trust—to "pay yearly to five poor workmen of the art and mystery of clockmaking, who were freemen of the City of London, or to the widow of each of such workmen the sum of twenty shillings." He is furthermore credited by legend with having made a watch for Queen Elizabeth; but we have to bear in mind that he was only known as a horologist in the reign of Charles the First, and thus dispel that curious fiction. However, there is in the Museum at Oxford a watch of a very interesting kind; one of those about which the Elizabethan myth hangs. It is a kind of hunting-watch, in gold case, of an ellipto-circular shape; the movement being beautifully set, and large turquoises studded over the case. There is, too, a chain made of gold lockets, some of them enclosing hair and other personal mementos.

Mr. East had his workshop and residence in Pall Mall, and Charles, when Prince of Wales, was a constant visitor. When the Prince was playing at Pall Mall, he called the stakes an "Edwardus East;" that meant a watch of East's making. Mr. East was undoubtedly what the late Mr. Vulliamy afterwards became; that is, the fashionable watchmaker for the royal and noble Pall-Mallians. His house was near the Tennis Court, and as that court was a private appanage of royalty, the class of frequenters all being personal friends of Charles, the customers of our Worthy of Horology may be understood.

John Burgis, another member on the first roll of freemen of the Company, left a very curious watch behind him, which is, or was, to be seen in the compact little Museum of the Market-place, Dover. I never go to Dover without visiting this Museum. The watch that John Burgis has left is now a real curiosity. It is of the Nuremberg egg-shape pattern, and occupies a pair of silver cases. There are two dials that move apparently round a common centre; but as it can only be seen under a glass case, one cannot say much about that part of it. One of the dials has the twelve months of the year numbered upon it, in addition to other figures, and the signs of the Zodiac in the centre. The names of the months are marked further within to that of the numerals. The second dial has the timekeeping part; namely, the hours. Below all this work there is a revolving-plate having the days of the week upon it. Furthermore, we can look down upon the days of the month, the state of the moon, by an image of the moon herself, whilst "John Burgis, fecit," ends the workmanship.

The watch of Alcock was partly of a similar kind. It was of the prevailing shape, and showed the day of the month, the age of the moon, and the tides. On the upper plate, as is now the practice, was engraved, "Thomas Alcock, fecit."

Francis Torado, of Gray's Inn, left behind him a silver oval hunting-watch, which must have been considered very valuable. It had a silver dial, an hour-hand only, catgut instead of chain, no pendant, and there were raised pins at each end for feeling the time of night. It is one of the earliest specimens of the "Touch Watch," and as travelling in those days was gone through in dark coaches, the pins for time-telling were invaluable.

The above-mentioned are all the watches that I have been able to trace as having been made by the now famous men whose names glorify the Company's books on their incorporation from 1631 to 1632; they certainly never expected to become so famous as they have done. But there is one matter deeply to be regretted in connection with the Company; and that is, that, so far as I can learn, not a single portrait of any of them is known to exist, or, if any do exist, their existence is unknown to the Clockmakers' Company. We have to come a little nearer to our own time, when the Horological Worthies of that generation came to the front, both as inventors and also as improvers of what the previous men of genius had left behind them. It will be seen from the foregoing, that whenever a clock or a watch which those devoted students and workers, left behind them, is found, it is highly prized, and a price given for it which shows the estimation in which their handicraft productions were held.

It does sound oddly in our ears to read that a king had his watchmaker within hail during the hours of his amusement with his courtiers, and that the stakes played for in the several games were watches. What was more, that the name of the maker stood for that of the instrument itself. "Society," as the ethereal beings of the upper atmosphere is called in the aggregate, seems to be getting into a most deplorable condition for want of something to do. Lawn Tennis, alas! has become too familiar. Why do not they try King Charles's plan, and play for watches? It may be answered that each of them has a watch at it is. But, even so, if they only go the right way to work, see what an impulse would be given to the watch trade. Furthermore, there could be a bazaar for the sale of these watches, and if they were duly ticketed with the names and ranks of the winners and losers, and, if possible, the winners at the stalls, just imagine what a grand feature of the annual London season it would become. There are lean charities in London, and the peccadillos of this erring life might be considerably condoned by dividing the proceeds among the poor, and sick, and homeless.

The Queen's Present to Captain Shaw, of the London Fire Brigade.

Her Majesty, the Queen, has recently presented Captain Shaw with a bracket, or table clock. The case is of black marble, about fourteen inches high, square-sided in shape, standing upon four golden balls, and having a Corinthian pillar upon each side of the dial, which latter is black with gold figures. The surmounting of the case is very appropriate, and tells its own story. There is a helmet of gold resting within the line, formed by a beautifully-executed bronze imitation of the fireman's belt and hatchet. This may be called the crowning of the design, and most harmoniously in keeping with the character of the gift it appears. The movement is that of a French pendule clock, striking the hours and half-hours upon a spiral gong-wire. Underneath is the following inscription upon a golden plate. "Presented to Captain Eyre M. Shaw, C.B., Superintendent of the Metropolitan Fire Brigade, by Victoria, R.I."

The R.I. signifies Regina Imperatrix; that is, Queen and Empress. A large number of ladies and gentlemen have, by the courteous permission of Captain Shaw, inspected the handsome present, and given utterance to their admiration in very gratifying terms. It is rather difficult to say who has the right to be the most pleased at this incident, Her Majesty, or Capt. Shaw. The first-named on account of the kindly expressions and loyal feelings which it has called forth towards herself; or the latter at the distinguished, social honour and heir-loom which has been conferred upon him. I will slightly paraphrase a line of Byron about Moore, the poet, and fitly apply it to the happy recipient here:—

> "He won it well, and may he wear it long."

It is from Benson, Bond Street. C. Stuart Murray.

How to Finish a Full-Plate Fusee Watch.

Concluded from page 53.)

SUPPOSING the watch in question to be a hunter, it is important that the glass should be the right height. It is a common fault with glass fitters to fit one that is too high, and if the centre arbor is worked to it, it entails constant trouble to the wearer. Then, again, the cover and bezel should open square, so as to give room for the fingers in setting the hands. The body of the cannon pinion must not be taper, and the broach used for the hour wheel must be the same shape. When the hour hand is fitted on, the wheel ought to be tried on the pinion the reverse way, to make sure that it does not bind at the mouth, because when the pipe is small, the hand often closes it; this is a very insidious fault, but perhaps not more so than the binding of the pinion on the centre-wheel stopping. The ordinary "cut and run" examiners used to file down their centre-wheel arbors before taking the watches to pieces, and send the motions away for the hands in a few minutes, so failures were not to be wondered at; but the proper way is to try the shake of the centre wheel with the pillar-plate alone, after the cannon pinion has been properly pressed down. Hands that "jump" in setting are a great nuisance. This generally arises from the centre-wheel arbors being oval, owing to their being "filed" down by the motion-maker, instead of turned. This is one of the "original" defects in watches which baffle the skill of the most intelligent jobber to correct properly. The cannon pinion is usually "sprung" on, as if the hands are attempted to be set with a tight key; there is a danger of its being drawn upwards when the key is taken off, besides which, the action of setting is much smoother. There are two methods of "springing on"; one is done by filing a hollow in one side of the pinion and making a dot in the centre with a prick punch. This will make a bright mark in the centre-wheel arbor, which must be deepened by the graver in the turns; then, if the place has been worn off the cannon pinion in forcing on the arbor and working it round, it must be again struck with the punch. Care must be taken that the centre arbor is not taper backwards, otherwise the pinion will never fit properly, and the reverse fault is as bad. The other plan is termed "lanterning." A groove is turned in the centre of the pinion, and a nick made in it with a punch shaped like the end of a screw-driver. This is generally adopted in keyless watches, but there is much more risk of the pinion breaking in half in the hands of jobbers.

It is now time to seriously think of putting the watch together. The most difficult thing to an unskilled workman is to put in the lever and pallets. Escapement makers reverse the top-plate, and thus get the nose of the lever safely under the potence, before putting the pillar-plate on. The usual plan with finishers of fusee watches is to put all the work in but the barrel and pallets, and then to raise up the plate by the barrel-pillar, in order to enable them to slip the lever in, it being held in the tweezers by the tail. If the plate is raised too much, perhaps the escape-wheel will fall out, or the detent spring may get underneath the detent. In endeavouring to replace them there is a great risk of the lower pallet staff pivot being dragged off by the potence fouling the lever. The escape holes must always be oiled before putting the plates on. There is this peculiarity about a full-plate watch, that the freedom of the train cannot be tested by winding it up and letting it run; the most that can be done is to push the great wheel, and to see if the pallets run back freely. The third wheel is then taken out by removing the bar. This disconnects the train from the escapement, and enables the adjustment to be finally made, the bar being replaced on account of the fourth wheel being loose. In putting the chain on, it is most essential that it does not get bent or twisted; everything should be so prepared that there is no check in the operation. The ratchet must be put on the best fitting square and marked, the hole in the barrel and the notch in the fusee must be brought to the outside of the frame, which is held vertically in the left hand, and the chain dropped through until the barrel hook reaches the hole, when, by the aid of a long winder, it is wound back on the barrel, care being taken to prevent the turns from getting too high up, or over-riding. As soon as the fusee hook is over the notch, it is placed on the pin and the chain drawn up tight; then the spring is "set up" a little by turning the ratchet, and the click put in and screwed. Put detent out of action by turning the blade back, then fix the adjusting rod on the fusee square and wind up, taking care that the chain enters properly on each turn of the fusee; otherwise, if the edges are injured, there will be a constant tendency for it to ride up. Thoroughly test the action of the stop by letting the rod go back a little, and bringing the poke up again. Then let the rod revolve freely, noticing each turn of the fusee that the bob passes over with the same degree of velocity. If the spring is weakest at the bottom it must be set up more, and when the adjustment is correct, the tooth of the ratchet opposite the click must be marked. All this has been supposed to have been done when the watch was in the grey, but the detailed explanation seems to be more suitable when applied to the final operation. It should also have been determined whether the mainspring is sufficiently strong to carry the balance, otherwise all the trouble will be useless. The length of the chain is also an important thing to get right. It is usual to have eleven links projecting beyond the poke of the cap. If it is too long there is danger of the upper turn over-riding, and if too short it will break. After this, replace the third wheel and proceed with the springing. This has already been referred to in previous papers, and requires no special notice now. In the olden time some finishers were put to sore straits to contrive a substitute for a regulator. One plan was to suspend a weight from a piece of string, rather more than thirty-nine inches in length, and set it swinging. By this means a fair approximation to full seconds was obtained, but the length of the string was affected by the condition of the atmosphere, and required occasional testing. One finisher might often have been seen outside a watchmaker's window in Clerkenwell, counting the oscillations of his "pendulum" by a dead seconds regulator. Now, in spite of improved appliances, the business is all but gone, and there are not a few who think that the old times were the best; but as they will never return, the only way is to bring our ideas to the requirements of the present period. From the great care required in their construction, the production of reliable fusee watches has necessarily been limited, and the manufacture could never be sufficiently expanded to supply the demands of the million, or "millions," therefore the large factories have entirely discarded them for those with going barrels. On the other hand, the full-plate fusee watch is not without staunch supporters, as will be shown by the following extract from a letter received from a valued correspondent early in August.

> "I am glad to see the paper on Watch Finishing in this month's issue, it should be of service to jobbers.
>
> "From the great number of good full-plate fusee watches that are sold in the provinces, we country retailers still hold the same view as we did twenty years ago; although very few may now be finished in London, Coventry still makes a great quantity of thoroughly good, sound, well-finished watches of that description. Very few manufacturers know what good steady time can be got out of a good full-plate lever, with a good compensation balance. After a watch has been cleaned and got to time, it will frequently go three or six months in the hands of good wearers, and not be more than a minute or two out of time. Our great trouble is with rotten keyless, common Americans, and Genevas."

An Accurate and Cheap Micrometer.

Proof Extract from the "Uhrmacher-Kalender."

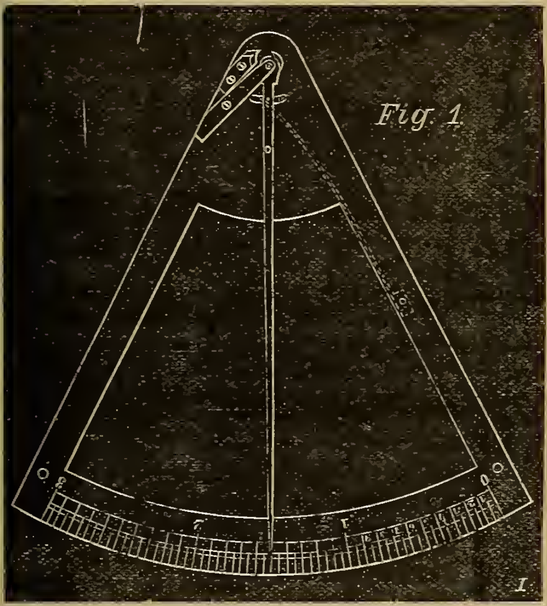
By M. Grossman.

(*Continued from page* 55.)

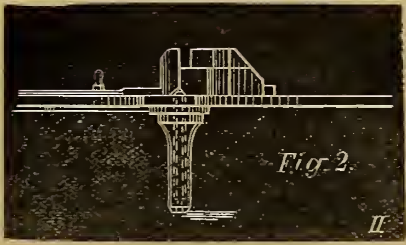
For the plain micrometer to obtain pre-determined conditions, I had to assume an opening of 54°, whereby I obtained a span of 3 mm. As it may often be desirable to measure objects which exceed 3 mm. in thickness, I have attached an adjustable chuck to the fixed claw, whereby an additional measurement of 3 mm. or 6 mm. altogether can be obtained. The divisions are set off an arc of 150 mm., and there is a clear space between each of the 300 divisional lines equal 0·44 mm., so that the hundredth parts can be read nearly as easily as those on the decimal gauge.

The accompanying diagram (half its right size) shows the plan of the instrument. The simplicity of its construction excludes the need of any extensive definitions.

The movable (in the diagram Fig. 1, half open) claw is centred on an axle, whose lower pivot runs in a hollow cone at the narrow end of the gauge. Likewise at the lower side of the gauge a spring is fixed, which brings the hand back to zero.



From this the instrument will be readily understood. Certain it is, that it does not possess the neatness and elegance of the round micrometer (the basis of its construction is due to the late Ad. Lange), but its lesser susceptibility to damage will be welcomed by those who are under the necessity of entrusting it into the hands of workmen, who are not in the habit of handling their tools as watchmakers should do.



If its deficiency as to minute measurement is called into question, it may be observed that it scarcely falls short of the other, because it does not contain the source of errors that may arise from gearing.

The isometrical divisions are obtained by a method which represents the geometrical conditions on an enlarged scale, and which suit the angular opening of this micrometer. All of them have their divisions alike, and are true duplicates of one another.

I would use this opportunity for observing that imitations of my micrometers, which are badly made, have been in the market for years, and apparently with ignorance of the principle that subtends them.

Is the difference of price an equivalent for the difference of quality? This is a question for those to decide who have to work with them.

That I should not be credited with such "tinker-productions," all my instruments will be stamped with the name of my firm and a running number.

Chronometer Trials.

The Greenwich list, of which we publish an abstract, does not present any special features of interest in addition to what have already been noticed by us. We expressed an opinion last year that the performance of the first chronometer, which had a trial number of 9·1, the greatest difference between one week and the next being 2^s, could not be surpassed by its maker. This year, the corresponding figures are 15 and 3^s4, the conditions of the trial being almost identical. It is the custom of the Astronomer Royal to report particularly upon the performance of the first six, and we find that in 1881 the average of their trial numbers was 23·11; in 1882, 18·61; and this year, 21·58. The published figures are the weekly sums of *daily* rates, and it is only due to the computers at the Observatory to pay a tribute to their invariable accuracy; their verdict is never disputed, as is often the case in other competitions, although a mistake in a tenth of a second would alter the position of a chronometer on the list, as in the case of the third and fourth this year. We imagine that the "big" rate of the Trans-Atlantic instrument (Heinrich's) must have rather surprised them. The low position of Mr. Schoof's experimental piece, is mainly caused by acceleration, although in September, 1881, he wrote to a contemporary as follows:—"I am preparing a marine chronometer now, which I shall ask leave to have tried at Greenwich, if possible, for the next trial, if I can succeed in conquering the acceleration sufficiently by that time." Assuming this to be the same instrument, and giving Mr. Schoof credit for considerable experience in the treatment of springs, it follows that the prevention of acceleration cannot be effected with certainty. Sometimes it is caused by the spring, and at other times by the alteration that takes place in the balance, after the severe trials in heat. It is worthy of notice that the conditions to which chronometers are exposed at sea are becoming altered. On sailing vessels the average temperature rarely exceeded 70°, but the heat in the vicinity of the engines in large steamers is very much in excess of this, and the boxes of some chronometers, after comparatively short voyages, look as if they had been tested in the highest temperature at the Observatory.

The *Journal Suisse d'Horologerie* contains the report of the sixth trial of marine chronometers at the Hamburg Observatory during the winter of 1882-83 (October to April). We noticed the previous report in our May issue, and have nothing to add to what we then said. The trial number of the first chronometer (8) has never been surpassed, but the conditions of trial are more favourable than our own.

Abstract of Principal Changes of the Rates of Chronometers on Trial for

NAME OF MAKER.	No.	Whether 2 or 8 Days.	ADDRESS OF MAKER.	Construction of Escapement and Balance, from the Description furnished by the Maker.	Least Weekly Sum. s.
Kullberg	4067	2	105, Liverpool Road, N.	Reversed detent, with short spring.	– 11·8
Robinson	3077	2	106, Howard Street, North Shields.	Auxiliary to balance. Airy's compensation arm.	– 1·0
James Poole & Co.	5780	2	33, Spencer Street, Clerkenwell, E.C.	Poole's auxiliary. Palladium spring.	– 6·0
Kullberg	4070	2	105, Liverpool Road, N.	Reversed detent, with short spring.	+ 7·5
Williams	3664	2	3, Bute Docks, Cardiff.	Ordinary balance, with auxiliary compensation.	– 0·6
Isaac	1668	2	10, Spencer Street, Clerkenwell, E.C.	Balance, without auxiliary.	– 1·6
Langford	1883	2	53, Quay, Bristol.	Flat rim balance, with fine adjustment.	– 10·4
Robinson	3078	2	106, Howard Street, North Shields.	Auxiliary to balance.	– 1·9
Sewill	3607	2	61, South Castle Street, Liverpool.	Auxiliary compensation.	+ 17·1
Pyott	488	2	74, West India Dock Road, E.	Ordinary balance, with slight addition.	– 7·6
James Poole & Co.	5762	2	33, Spencer Street, Clerkenwell, E.C.	Poole's auxiliary.	– 7·9
David Reid	1641	2	39, Grey Street, Newcastle-on-Tyne.		– 8·1
Mercer	3746	2	161, Goswell Road, E.C.	Ordinary balance, with auxiliary compensation.	+ 3·0
Lister and Sons	824	2	12, Mosley Street, Newcastle-on-Tyne.	Poole's auxiliary. Airy's compensation arm.	– 13·6
Williams	3690	2	3, Bute Docks, Cardiff.		– 7·7
Bishopp	5564	2	20, Bunhill Row, London.	Auxiliary for extremes of temperature.	– 13·8
Moore	5756	2	102, High Street, Belfast.	Auxiliary to balance. Airy's compensation arm.	+ 4·2
Heinrich	3	2	New York.	Heinrich's patent auxiliary.	+ 48·5
C. Frodsham and Co.	3597	8	84, Strand, W.C.	Charles Frodsham's three-bar compensation balance.	+ 0·5
Lawson	2353	8	241, Liverpool Bldgs., Liverpool Road, N.	Auxiliary, acting in extreme temperatures.	– 9·8
David Reid	5599	2	39, Grey Street, Newcastle-on-Tyne.	Airy's compensation arm.	– 18·8
Lister and Sons	825	2	12, Mosley Street, Newcastle-on-Tyne.	Poole's Auxiliary.	– 8·0
Webb	5566	2	90, High Street, Islington, N.	Auxiliary compensation.	– 8·4
Nelson	2829	2	453, New Cross Road, S.E.	Auxiliary, gaining in cold. Airy's compensation arm.	– 13·7
Reid and Sons	5785	2	41, Grey Street, Newcastle-on-Tyne.	Auxiliary to balance.	+ 6·8
Sewill	3665	2	61, South Castle Street, Liverpool.	Auxiliary compensation.	– 12·2
Nelson	2836	2	453, New Cross Road, S.E.	Auxiliary, gaining in cold. Airy's compensation arm.	– 10·2
Oram and Son	19181	2	19, Wilmington Square, W.C.	Ordinary Balance.	+ 9·8
Birchall	1382	2	12A, Stonefield Street, Islington, N.	Ordinary balance, with slight alterations.	– 19·7
Webb	5565	2	90, High Street, Islington, N.	Auxiliary compensation.	– 18·0
Smith	6299	2	48, Southside Street, Plymouth.	Double auxiliary to balance.	+ 4·9
C. Frodsham & Co.	3598	8	84, Strand, W.C.	Charles Frodsham's three-bar compensation balance.	– 15·1
Reid and Sons	5781	2	41, Grey Street, Newcastle-on-Tyne.	Auxiliary to balance. Palladium spring.	– 17·7
Keys	380	2	15, Craven Street, Strand, W.C.	Ordinary Balance, with Airy's compensation arm.	– 1·2
Hennessy	3644	2	5, Wind Street, Swansea.	Auxiliary compensation to balance.	– 9·8
Schoof	6050	2	99, St. John Street Road, E.C.	Schoof's improved resilient lever escapement.	+ 7·0
Oram and Son	18750	2	19, Wilmington Square, W.C.	Auxiliary compensation.	+ 12·2
Keys	450	2	15, Craven Street, Strand, W.C.	Auxiliary compensation.	– 0·7
Mercer	3664	2	161, Goswell Road, E.C.	Ordinary balance, with auxiliary compensation.	+ 1·1
Hennessy	3664	2	5, Wind Street, Swansea.	Auxiliary compensation to balance.	– 11·1

The sign + indicates that the rate is gaining.

† During these weeks the Chronometers were placed in the chamber of a stove heated by jets of gas. The gas flames are exterior to the chamber, into which none of the injurious products of combustion can enter. In the column "Before and after what Day" the positions of the symbol (†) before or after that date, indicate respectively exposure to heat in the week immediately preceding, or in the week immediately following.

The Temperature ranged from 42° Fah. to 107° Fah.

Purchase by the Admiralty, at the Royal Observatory, Greenwich, 1883.

In what Week.	Greatest Weekly Sum.	In what Week.	Difference between the Greatest and Least.	Greatest Difference between one Week and the next.	Before and after what Day.	No.
	s.		s.	s.		
May 19 to 26†	− 3·6	March 31 to April 7	8·2	3·4	† June 16	4067
March 17 to 24†	+ 10·2	May 5 to 12	11·2	4·6	May 12	3077
March 31 to April 7	+ 3·3	January 27 to Feb. 3	9·3	6·5	† March 31	5780
January 13 to 20 January 20 to 27	+ 18·4	April 14 to 21	10·9	5·8	† March 24†	4070
February 24 to March 3	+ 12·3	May 5 to 12	12·9	5·5	May 19†	3664
May 19 to 26†	+ 10·6	April 7 to 14	12·2	6·6	† June 16	1668
February 24 to March 3	+ 4·9	June 23 to 30	15·3	5·4	March 3†	1883
March 3 to 10†	+ 16·6	June 23 to 30	18·5	4·0	† June 16	3078
January 13 to 20	+ 28·1	March 24 to 31†	11·0	8·4	March 3†	3607
June 16 to 23	+ 3·1	June 2 to 9†	10·7	9·4	† June 16	488
January 13 to 20	+ 8·7	July 14 to 21	16·6	6·7	† March 31	5762
April 21 to 28	+ 6·9	June 30 to July 7	15·0	7·5	† March 31	1641
January 20 to 27	+ 20·1	July 7 to 14	17·1	6·9	March 3†	3746
June 16 to 23	+ 5·9	January 27 to Feb. 3	19·5	5·8	Jan. 27	824
February 3 to 10	+ 4·8	July 14 to 21	12·5	9·6	March 3†	3690
January 20 to 27	+ 3·3	July 7 to 14	17·1	8·8	March 3†	5564
January 20 to 27	+ 20·9	June 9 to 16†	16·7	9·1	March 3†	5756
March 31 to April 7	+ 63·1	May 19 to 26†	14·6	11·5	† March 31	3
March 2 to 10†	+ 21·3	May 5 to 12	20·8	9·9	April 7	3597
February 24 to March 3	+ 18·7	July 7 to 14	28·5	6·3	† March 10†	2353
January 27 to Feb. 3	− 1·1	July 7 to 14	17·7	11·7	March 3†	5599
January 27 to Feb. 3	+ 15·2	July 7 to 14	23·2	9·0	May 19†	825
March 31 to April 7	+ 7·5	June 2 to 9†	15·9	13·3	† March 31	5566
March 3 to 10†	+ 8·4	January 27 to Feb. 3	22·1	11·0	March 3†	2829
February 24 to March 3	+ 35·2	July 21 to 28	28·4	8·5	† March 31	5785
May 12 to 19	+ 6·9	March 24 to 31†	19·1	13·4	May 19†	3665
February 10 to 17	+ 12·2	June 9 to 16†	22·4	13·8	March 3†	2836
January 20 to 27	+ 41·1	July 21 to 28	31·3	11·0	March 3†	19181
May 26 to June 2†	+ 6·6	April 14 to 21 April 21 to 28	26·3	17·3	May 19†	1382
March 17 to 24†	+ 9·9	January 13 to 20	27·9	18·5	March 3†	5565
March 3 to 10†	+ 39·3	July 14 to 21	34·4	15·6	May 19†	6299
June 9 to 16†	+ 15·6	January 13 to 20	30·7	18·1	May 19†	3598
February 17 to 24	+ 14·9	May 26 to June 2†	32·6	18·4	March 3†	5781
January 20 to 27	+ 31·4	June 2 to 9†	32·6	22·5	† March 31	380
January 20 to 27	+ 25·0	May 12 to 19	34·8	22·0	March 3†	3644
January 13 to 20	+ 67·4	May 26 to June 2†	60·4	10·9	† May 26†	6050
March 3 to 10†	+ 43·8	May 12 to 19	31·6	29·7	May 19†	18750
January 13 to 20	+ 69·5	July 21 to 28	70·2	15·6	May 19†	450
June 30 to July 7	+ 12·5	April 21 to 28	....	5·7	March 3†	3664
March 3 to 10†	+ 5·4	April 21 to 28	16·5	9·2	March 3†	3664

The Chronometers are placed in order of merit, their respective positions being determined by consideration of the irregularities of rate exhibited in the Table above.

Mercer 3664. The main spring of this Chronometer was found broken in the twelfth week of the trial. It was removed by the maker on April 9, and deposited again on April 12.

Hennessy 3664. The main spring of this Chronometer was found broken in the seventeenth week of trial. It was removed by the maker on May 28.

The Ratings commenced January 13th, and ended July 28th.

The Manufacture of Repeating Watches.

(*Continued from page* 99.)

EXAMINATION OF THE KEYLESS AND REPEATING WORK (*Extracts*).

WHEN the case work has been thoroughly examined, the examination of the keyless work can be gone on with, so that it will not be necessary to return to it. This plan offers the advantage of being able to entirely finish off the barrel with the bar while the piece is being jewelled. If it is desired to do the hand work and point the dial before sending it to the jewellers, the divisions should be centred from the hole in the centre of the plate, after having placed the dial as truly as possible in the circle. Put the cannon pinion and the snail at their proper height, also the minute and setting hands wheels; examine if the glass bezel shuts down properly on the dial and on the edge of the band, and for hunters the height or thickness of the hands should be estimated according to the space comprised between the dial and the inside of the cover of the case.

The jewelling being done, it is expedient, before putting a repeater together for springing, to make in the plate and the bars the necessary openings to enable all the parts of the repeating and dial work to be put on without taking off other parts of the movement, and also that they may not be hindered in their action.

The screws of the dial work ought to be shortened, also the rods of the hammers; the finger which brings back will be pinned on, after that it has been ascertained if the rack pinion, placed at the bottom of the small barrel arbor, is sufficiently low that the twelve-toothed ratchet may be a little below the plate, in order that the rack can never touch it. The square and the pivot of the arbor should likewise be shortened, taking care to make a mark on the square for the pinion. Then the rack should be freed under the bridge. It is important that this can be easily taken off, the piece being in the case; the arm ought not to be bound on any point. The depth in the pinion should be verified, which ought to have a little shake, and then smooth the teeth. In order that the oil may remain in the depth, and that the teeth of the rack do not rub on the plate, a circle should be turned underneath them. The small wheels ought to be perfectly in order before passing to the action of the repeating work; oil must not be neglected to be put to all the pivots and the turns of the spring in the small barrel. When the holes are seen to, the examiner ought to arrange the necessary freedoms between the various wheels and the small barrel in such a manner that there shall be no friction during the running down of the spring.

PUTTING THE REPEATING WORK IN ACTION.

The twelve-toothed ratchet will be put in position, as well as the liftings, or pallets, and their springs; the springs of the hammers and their counter-springs, and the adjusting screw. The liftings will be put in action, and the springs made of suitable strength in agreement with the weight of the hammers; their blades ought to be free of the plate, and the acting parts well smoothed.

The striking of the hours and quarters should be tried, to see that the action of the hammers is not hindered by too much lifting. In this case, before going farther, either the cocks or the hammers may be filed, as much as is necessary for the piece to strike. Remount the rack, the star, the finger which brings back, the quarter piece, and the long piece or "locking spring," and then put the frame in the case to make sure that the action of the slide is sufficient for twelve hours, and that the locking piece has space to return, in leaving to the slide a little play with the arm of the rack.

After that, the recoil of the hour snail against the arm of the rack on each of the twelve hours should be verified; note those that will require filing. In the case where it will be too much on the eleventh and twelfth hour, there will be no other resource than to change the position of the snail on the star; and if, after this changing, the arm of the rack does not safely bear against the snail at the first hour, it must be hammered out at the end.

Before making the verification of the striking of the hours, the cannon pinion should be put in position, on which the quarter snail will be lightly rivetted, and the "surprise" freely held by its collet, very nicely adjusted on the cannon pinion. The sides of the pallet gearing with the star wheel, should be slightly rounded; it ought to pass with certainty at the first hour (or one o'clock) in advance of the hour snail.

The curve of the long piece, or "locking" spring, should be adjusted at the commencement in such a manner that the lifting of this piece, produced by the play of the arm against the rack, after that it has touched the snail, shall be equal on every hour.

It will be well to put the blade of this spring to a suitable strength before the operation.

The passage of the lifting of the hours with the teeth of the twelve-toothed ratchet, corresponding to each of the twelve steps in the hour snail, should then be verified; for that, the slide should be lightly pushed exactly to the point to make the quarter piece unlock from one to twelve hours. In the case where it sounds one hour too little *on every hour*, the excess of the lifting of the long piece should be taken off, by filing at their point of contact the arm of the rack or the small moveable lever, or else the said lever at its point of contact with the unlocking spring. In the case where there should not be an excess of lifting, the end of the arm of the rack should be filed, that is to say, the part which rests against the steps of the snail.

If, in pushing very lightly, it strikes an hour too little on certain steps of the snail, these should be filed to bring them in agreement with the others, and the excess of the lifting of the long piece should be corrected by means of a pin fixed in the plate, against which the said piece will be stopped at the moment of unlocking. The arm of the rack might also be hammered, so as to diminish its play against this, after the moment that it has touched the snail.

If, in pushing the slide with a certain force, it strikes an hour too much *on every hour*, the arm should be hammered, so as to diminish its play against the rack, or else at the part which rests against the snail.

If this part of the arm is found to be already weak, the first process is preferable; nevertheless, if, in diminishing the play of the arm against the rack, it prevents it from striking an hour too much, this alteration diminishes on the other hand the lifting of the locking piece, produced by the small moveable lever; and if the unlocking should not be able to be effected, when even it is pushed very strongly, then the quarter piece or the long piece should be filed to diminish the amount of the locking, until the unlocking shall have taken place with certainty.

Then, if, in pushing the same to the bottom, it strikes an hour too much on some hours only, the other steps on which it strikes correctly should be filed, to put them in agreement with the first. The snail being equalised, it will strike an hour too much on every hour; this should be corrected by one of the means previously indicated.

When the arm of the rack rests on the step of the twelfth hour of the snail, it is necessary that the inside of the high part of this latter, corresponding to the first hour, is sufficiently taken back, so that when the star-wheel is turned until the snail is stopped by the arm, the point of the tooth of the star-wheel may have gone beyond the shifting point, so that the arm cannot touch against the high part of the snail before the star has shifted on one hour.

After this first overhauling, it should be ascertained that the piece strikes with regularity, that nothing hinders the complete lifting of the hammers, that the quarters or five minutes are not too quick after the hours, and that in the minute pieces the quarters and minutes are in harmony with the striking of the hours.

(To be Continued.)

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Tangents of Trade Mark Law.

By C. Stuart Murray.

(Continued from page 55).

As has just been said, a manufacturer is entitled to register any distinctive mark which he had used as a trade mark before the passing of this Act; but in case of registration being refused to him, he can demand a certificate of such refusal. The possession of this certificate will place him in a position to exercise whatever rights he may have had before, and independently of the Act or Acts. Another thing: it is impossible for a single manufacturer to take to himself the exclusive use, for a trade mark, of a name which is common to many other persons besides himself. He must combine something distinctive with the name, so that it shall be known apart from all others of the same kind.

If a man uses even his own name for the purpose of taking away the custom of another man of the same name, he can be restrained up to a certain point; thus, a man was in trade and used a particular kind of label for his goods. His brother went into the same trade and set up a kind of imitation of the original label. An injunction was moved for, when the defendant's brother was adjudged to pay costs and damages, as his imitation was clearly a fraud. He might use his own name simply in his business; but it must not be done in such a way as to deceive others that his goods were those of his brother, the plaintiff. In another name case, a man had a son employed in the same business with him. The son disagreed, went away, and set up in a different part of the town for himself, to sell the same class of goods. He used his own proper name, and added *late* of so-and-so. During the argument of the motion for an injunction, the word "late" saved the defendant's son from the offence of attempted fraud, which was held not to have been proved by intention. An action was afterwards brought upon the use of the name only. Upon the trial, it was decided that the use of a man's name, under certain conditions in his business, was as strong a trade mark as could be suggested. The exception was, as has been stated above, where another man of the same name had been previously established in the same way; then, the mere name might be a very inadequate security; subject, however, to another man being previously in possession of his name conjoined with his goods, the personal name has been decided to be a true trade mark.

The Trade Mark Registration Act of 1875, which has been already quoted, has removed any inconvenience about the use of the name as formerly existing, by providing that such name may be "printed, impressed, or woven in some particular or distinctive manner." In this way a trade mark, says one of the legal authorities, consisting of a name, will be good against all the world, without exception; for with the mere letters that form the name, or names, some further element is to be combined in respect of colour, pattern, or something to distinguish that particular name-owner from all others of the same name elsewhere. It may here be mentioned that the United States Commissioners of Patents will not receive any trade mark with the name of a person or corporation only; there must be some mark or marks of distinction, so as to note that name, in its trade mark difference, to a similar name belonging to another person. In this country and the colonial dominion the name need not be that of the actual manufacturer. Having become a trade mark it may pass as property, and be assigned to a successor, subject to a connexion with the goodwill of the business. Fancy names from mythology, &c., are very common, and even of persons who have lived or are living, many of which will occur to the reader himself. Such fancy names cannot be registered as trade marks, unless they have been in actual use before the passing of the Registration Act. If the marks are continued in use, as well as having been used before the Act, they will be registered under the latter part of Section 10 of the Act, in which provision is made in such cases.

The second class of trade marks consists of signatures of manufacturers, or firms, written in a particular and distinct manner, with the combinations as previously mentioned. The third class of trade marks is a "distinctive device, mark, heading, label, or ticket;" to this, again, may be added "any letters, words, figures, or combinations," &c., as before.

We next come to simple devices of animals, and parts of animals, as well as other things. There is the Government Broad Arrow, the Goldsmiths' Leopard's Head, a Pyramid, Triangle, Bell, Compasses, and many others. It may not be out of place to caution some of our readers about the risk that they run in using the marks of the different Assay towns throughout the country. I have heard persons maintain that modification of some of the marks could be used because they "were public property." But, it must be borne in mind that the basis of such "public property" rests upon Acts of Parliament, several of such Acts dating from the fourteenth century, although some of the marks have been a little altered. Thus, at one time the Leopard's Head of the London Goldsmiths' Hall had a mane and beard, and wore a crown. In 1823, I think it was, that the head lost its crown, the mane and beard having been previously "shaven and shorn," and in that denuded style we have it as we see it upon our plate now. That *caput* must, certainly, not be meddled with.

We next have Birmingham with its Anchor. And that is a very oddly selected sign, if what may be called the harmony of surroundings is considered. Here is a town in the very central zone of England, without any navigable river nearer than the Trent, having an anchor, of all other things, the universal emblem of ships and shipping all over the world, from the days of Noah,—aye, of Noah's ancestors downwards. There seems to be a touch of humour in some of these apparently misplaced devices; for has not Birmingham's pleasant suburban neighbour, Coventry, an Elephant and Castle for its Common Seal, as if it were situated in some ancient, antediluvian province of Hindostan, instead of among the fair glades of Warwickshire. Well, the anchor must not be "annexed" for gold or silver-ware trade marks. Camden, the historian, who succeeded Leland, travelled through England in the sixteenth century, in order to collect material for his well-known book, *Britannia*, says of Birmingham, that "most of the inhabitants be smiths." Bishop Gibson, who published a revised edition of Camden in 1722, adds—"and other artificers in iron and steel, whose performances are greatly admired, both at home and abroad." As anchors have been made by smiths ever since there have been anchors, it may be that the "hardware village" deemed an anchor for its assay mark altogether in accordance with the fitness of things.

Chester, with its Dagger and Wheatsheafs, offers a better chance, on account of so many articles being represented. The Crown of Sheffield stands by itself, although the "sigillum villa" of the town shield, the sheaf of fifteen arrows, might have been added. It is to be regretted that a Sheffield blade was not "worked in" somewhere. Exeter's castle, with three towers, is somewhat open to the trade mark inventing genius; but the donjon keep of Edinburgh is not. Glasgow now having a tree, a bell, and a fish, with a bird on the top of the tree, and a ring in the mouth of the fish, offers a tempting bait. The simple figure of Hibernia, in the Dublin assay office, does not require further notice.

A man's crest may be a trade mark; but, notwithstanding that, an eagle was too late. A manufacturer brought out that royal bird as a trade mark for himself, but speedily became the object of an injunction. Another manufacturer had had the eagle in use before him; so that the second man was restrained from using his own crest, because another man, whose crest it was not, had trade-marked him out of the field! There is a fourth class of old, distinctive marks, being words or combinations of words and figures, of letters used before the Act of 1875. They are still in use, and, of course, will continue to be in use so long as any value remains in them. A word which was first applied to, or was even invented for the sole and express purpose of designing a new substance or composition, may prove, on investigation, to have ceased to retain the characteristic, which it once possessed, of conveying the idea of the goods being of one particular manufacturer. When such a case arises, the person first using the word will cease to have any exclusive rights in it, since it will have become purely descriptive of any article which all may freely make. The name thus becomes *publici juris*—the right of the public—and not only can be, but ought to be, employed by all who manufacture and sell an article, which they are at perfect liberty to name and sell, and of which the name in question is the appropriate designation. Under these circumstances the rival makers could not do better than adopt the maxim of Plautus; namely, *Proba mera facile emtorem repperit*:—Good wares easily find a buyer.

I will conclude this subject next month.

THE SILVER TRADE.

TO THE EDITOR OF THE "WATCHMAKER, JEWELLER, AND SILVERSMITH."

Sir,—It has been well said (by Coleridge) that "human experience, like the stern lights of a ship at sea, illumines only the path we have passed over." One cannot but be reminded of this truism when thinking over the melancholy experience of the silver trade during the last few months. An old-established firm, once by far the largest contributors to the impolitic tax which has been their ruin, have given up business in despair. Another old manufacturer gone off the pastures new—Canada. Several others in a like condition of failure! Verily, our "stern light" reveals a melancholy story! As Addison says, "he hazardeth much who depends for his learning on experience; an unhappy master is he who is only made wise by many shipwrecks; miserable is the merchant that is neither rich nor wise till he has been bankrupt."

Here we have a trade very nearly taxed and regulated out of existence. Men leave it in despair. And yet, wonderful to relate, the tax, and all the absurd old laws, which, like a piece of whipcord tightly bound round the root of a rose tree, prevents any possibility of its growth, still continue.

When will working silversmiths see that, in the interests of themselves, their wives and children, foolish hindrances to trade should be abolished?

I am, &c.,

Edward J. Watherston.

Watch Manufacture in England.

The following important article appeared in the *Times* of the 23rd ult.:—

"The summary recently given by the *Times* Geneva Correspondent of the progress of the watch trade in Switzerland may be usefully followed by some account of the present position of the same industry in England. The extent of the English watch trade is broadly indicated by the watch-cases marked at Goldsmiths' Hall and the assay offices at Birmingham and Chester. A deduction has to be made for cases and movements of foreign origin, but some materials for this discrimination are available. In 1880, the latest year for which complete returns have been published, the total number of watches hall-marked was 206,000. The proportion of foreign cases and of foreign movements cased in England included in these returns, cannot be estimated at less than 25,000. At Chester, where a distinguished record has been kept, the foreign cases have averaged 13,000 per annum. Making the allowance required by these considerations, the total annual production of watches in England cannot be estimated at more than 180,000. If we contrast with this the fact that in 1796 191,700 watches were marked in Goldsmiths' Hall alone (complete returns for the whole country cannot now be obtained), it will be seen that the industry, viewed relatively to increase of population and general commercial expansion, has been suffering from distinct atrophy.

"Side by side with this fact must be noted the creation of the American watch trade, which within thirty years has probably attained three times the proportions of the English trade; the growth of Besançon, which has placed France among the most important watch-producing nations; and the immense development of the art in Switzerland. The English trade has now no pretensions to occupying the home market. English watch manufacturers find their most profitable business in the colonies; one hundred years ago they probably did not export 5 per cent. of their goods; the proportion is now about 50 per cent. At the same time the demand for watches at home has by no means slackened, but has kept pace with our national prosperity. This demand has been met and stimulated by the foreigner, and above all, by the Swiss, who are the great makers of watches for the million, and therefore the great makers of cheap watches. The tendency in the price of English watches is nevertheless downwards. Since 1870 the form in which the trade returns have been recorded does not admit of a comparison on this head, but the figures of previous years show that the average price of English watches exported fell from £6·76 in 1867 to £4·76 in 1870. There is no reason to believe that this tendency has been arrested, and on its development the future of the English watch trade largely depends. This condition is not inconsistent with the production of high-priced watches of superior quality; but it requires that the wants of unambitious buyers shall also be met. In this field foreign manufacturers, and notably the Swiss, have a practical monopoly. During the past five years our total importation of foreign watches (excluding foreign imports re-exported) has fluctuated between £400,000 and £500,000. In 1867 the import was only £186,000. Taking the four years from 1867 to 1870—*data* for a later survey are wanting—Mr. Edward Rigg, of the Royal Mint, has shown that the mean price of foreign watches imported for English consumption was £1·60; the average price of foreign watches re-exported was £2·86. The latter estimate compares most fitly with the average price of the exported English watch, which, for the same period, has been calculated at £5·41. English manufacturers would do well to consider whether this marked difference in price is justified by a corresponding difference in quality.

"The causes that retard the development of English watchmaking may be traced to defective organisation and defective appliances. The method of manufacture and the tools employed are not substantially different from the method and the tools of one hundred years ago. It is a natural consequence that the trade has shown no elasticity, and that in latter years it has found little custom at home. English watches are not made in sufficient quantities to justify the production on a large scale of any one particular type; the trade is for the most part in the hands of "small men," who make certain sizes in dozens and half-dozens. In the Swiss and American factories a particular type, if it be considered worth making, is made by thousands; everything is organised for production on a large scale. Confining the contrast to English and American methods, the principal point upon which it is necessary to insist is that in America the twelve or fourteen trades which constitute watchmaking are aggregated under one roof and form one compact organisation. By the older method still pursued in England, and until recently almost the rule in Switzerland, the different parts are transported from one workshop to another in different quarters of the town, and even from one part of the country to another. Under the new method the *maximum* of efficiency and individual responsibility is obtained by the minute subdivision of every process; the loss of time in the transfer from one department to another is so minimised as to be practically non-existent. In the United States one company alone employs a capital of £400,000, and with 2,300 hands produces 200,000 watches annually—an output equal to the entire English trade. There are no official returns of Swiss manufacture, but the best authorities estimate its growth during the past five years at 1,000,000 watches, the total standing to-day at 3,500,000. Besançon, the centre of the French trade, shows an equally remarkable progress. During the five years 1845-9 the average annual production of watches in France was 47,800; it now exceeds half a million. About 90 per cent. of the watches made in France come from Besançon.

"It may be taken that an expenditure of £50,000 is scarcely sufficient to aggregate the different branches of watchmaking under one roof, and to supply the new and improved appliances which, during the last fifty years, have been brought to bear upon the art. It would be mockery to tell a small and struggling tradesman that he must organise his business and make a hundred watches instead of one; combination is the only conceivable means by which, in the majority of cases, so radical a change could be effected. To this solution the jealousies and isolation of small manufacturers, their conservative instincts and love of independence, present obstacles that may be regarded as practically insurmountable. In the United States the capital required for associated enterprise has been easily found because the field had not been previously occupied and no trade traditions stood in the way.

"If this were the conclusion of the whole matter, the prospect would be hopeless indeed. Fortunately, efforts are being made in England to cope with the situation. A plant of machinery for the manufacture of the keyless type of watch has in recent years been established in London; an American plant has been put down in Birmingham for the production of both key-winding and keyless watches; a second firm in Birmingham is working an organisation for the production of the ordinary English watch in demand in the Colonies; and in Coventry modern treatment has been grafted on an old-established business, and is working side by side with old methods of manufacture. The financial results of such new enterprises may not at first be wholly satisfactory. In American watchmaking much money has been lost; out of a dozen companies, four only can be considered prosperous, while so far as the original shareholders are concerned, several companies have ceased to exist. The experience thus gained, though not directly profitable to those who have borne the cost, has added to the general stock of knowledge; and putting aside special impediments, the chief of which may be said to be the existence of a large number of manufacturers with limited means, the necessary transition might be accomplished in this country in much more favourable circumstances than attended the planting of the industry in the United States."

The following leader on the above article also appeared in the *Times* of the 23rd ult.:—

"The manufacture of English watches appears, from the account which appears in another column, to be in a stagnant condition. Trade rises and falls as States rise and fall. The indigenous watch trade is only sharing the fate of the Kingdom of Babylon and Coventry ribands. In themselves these losses of mercantile prosperity do not necessarily prove any fault in the sufferers, or always the existence of any suffering. A more advantageous field may have been offered to the capital and labour employed in the local industry. When, as unfortunately is the commoner case, the shifting of trade into new channels is locally and personally calamitous, there need be no sting of self-reproach added to the affliction. It was by no folly of their own that the weavers of Norfolk and Suffolk had to surrender their industry to Lancashire and Yorkshire. Sussex iron-workers did not throw away theirs into the hands of South Wales and Northumberland. Coventry weavers are not to blame for their starvation when fashion periodically deserts them for Lyons. New inventions revolutionize the course of commerce. The natural advantages which fostered it in a district cease to be advantages in an altered stage of manufacture. Every country, though as a whole it may remain prosperous, is as thickly strewn with the ruins of trade as Asia with ruined empires. No country is more affluent than Belgium; and it has its decayed Ypres. Holland is the home of ease and comfort and profitable diligence; and it has its melancholy cities of the Zuyder Zee. As the world advances towards the realization of the type of a single commercial commonwealth, the cycle of the progress and retrogression of trade widens. Manufacturers from a score of independent States compete on equal terms in every market. An English industry gives place to a French, and French to a Swiss, and a Swiss to an American. Instead of regret for the downfall, the feeling should often be rather rejoicing for the success. The one essential question is whether the victory be due to the merits of the conqueror or to the shortcomings of the conquered. When a local trade has to recede in its own territory through the blindness of workmen, as Thames ship-building, or from want of skill and enterprise in the masters, the punishment of a locality is not covered by a gain to the community. If the grievance be simply that competitors, whether in another parish or another hemisphere, have discovered superior natural resources, or have created a fresh industry under the old name, time and emotions are wasted in lamenting the overthrow of a local monopoly, or its inability to annex domains which others have pre-occupied,

Apparently the English watch manufacture exemplifies partly one and partly another of these conditions. Statistics indicate that fewer watches are produced than at the end of last century. Were the number the same, the trade could not be said to be stationary; it would be undergoing a real decline. The population of England has multiplied several times over in the hundred years. In wealth it has increased many times beyond that proportion. For each Englishman who could have afforded a watch a century back a dozen can afford watches now, and can afford them of a more expensive class. Beside these islands a vast colonial empire has since arisen, with a demand for watches comparatively much beyond the insular demand. Colonists look in the first place to England to supply them, and fifty per cent. of the home-made watches are exported, it is calculated, for their use. Prices of watches have also diminished largely, so that the two hundred thousand English-made watches mean a smaller return than formerly. English watches of the highest rank keep their hold on the market. At horological exhibitions English watchmakers have demonstrated their capacity for manufacturing as good watches as exist. Manufacturers in Switzerland and the United States boast that they can make as good, if they please. At all events, it does not often please them. From this point of view the English watch manufacture maintains its place honourably. But it maintains it as English vineries maintain theirs. For the general supply of the home market it is fighting a losing battle with the foreigner. With difficulty it ekes out the failing custom of this country by the patronage of the colonists, who can hardly be trusted to buy for ever English watches at an average of double the price of American and Swiss. Practically, it has no foreign customers, either on the Continent of Europe or in the United States. Clerkenwell watchmakers manufacture as cleverly and solidly as formerly. They have fallen back relatively because they have not learnt to make the medium quality of watch as cheaply as the manufacturers of the United States, and Besançon, and la Chaux-de-Fonds or le Locle. A watch is a combination of many parts. A dozen different sets of manufacturers unite to compose it. They do not interfere with or trespass on each other's department. The modern discovery, due to American proficiency in the art of distributing and economizing labour, has been that, instead of twelve masters conducting twelve distinct workshops, all may be brought together under a single roof and a single management. A consequence has been a vast saving in the cost of transport, in the avoidance of deficiences in one direction and superfluities in another, and in the expenditure on supervision. Sections of a watch turned out in a Clerkenwell shop by the ten are fashioned at the Waltham Works by the thousand. Tools and method are the same in England as a hundred years ago, because the capital invested in each workshop is scarcely larger now than then. A single company in the United States employs a capital of £400,000, and invests cheaply in labour-saving machines on the same scale.

"An industry need not be very productive to be deep-rooted and hard to move. The English watch manufacture is old and conservative. In the United States it was a new thing. Speculators had only to collect the capital, raise the buildings, and offer liberal wages to journeymen. In England, watchmakers have been accustomed to work in separate and small workshops. As much of the work is done by masters as by men. They would struggle against a change of arrangements which must convert them from masters into workmen. If an application of the co-operative principle overcame this objection, there would remain the difficulty of raising the indispensable capital, at the risk of losses such as co-operative undertakings are always liable to incur. Manufacturing watchmakers in England have not the means of setting up at their own cost works of dimensions compatible with the manufacture of cheap goods. At the same time they have so occupied the ground as to obstruct more or less the attempts of more adventurous and wealthier capitalists. The form in which the English watch manufacture has been hitherto conducted engages the sympathy. There is no pleasure in imagining the whole of an industry concentrated in a few gigantic manufactories. No class of men is more intelligent than the body of English watchmakers. Their work is honest, and on the whole it is thorough. But statistics are remorseless and heartless; and statistics demonstrate it to be doomed. A total annual product of 180,000 watches puts the English watch manufacture out of the range of national trades. It falls to the level of the trade in paper weights, or book slides, or letter-weighing machines, or magic lanterns, and is much below the manufacture of playing cards. If it were a fancy trade like those, it might not matter, except to the men who live by it, how soon it dwindled and perished altogether. On the contrary, it has nothing of the character of a fancy trade; the growth of foreign watch manufactories shows the extent of its capabilities; and it is inconceivable that England and Englishmen should allow themselves to be excluded from participation in its commercial benefits. Birmingham and Coventry, at any rate, seem to have no intention to acknowledge defeat without a struggle. Mr. James Lowther told the Coventry Conservatives last week that he is not one of those who have bowed the knee to the Baal of Free Trade. Probably his receipt for a cure of the ailments of the Clerkenwell and Coventry and Birmingham watch trade would be an interdict on Waltham and Neufchâtel watches. The Birmingham and Coventry watchmakers know better. They are preparing to take a lesson from their foreign rivals and manufacture wholesale. No reason can be discovered in the nature of things why watch works which are produced efficiently and cheaply abroad by a careful distribution of labour should not be executed as efficiently and at least as cheaply here in accordance with the same method. Nowhere is labour combined and distributed more scientifically than in England and by Englishmen. Swiss watchmakers until recently conducted their industry as it is in Clerkenwell, and was conducted at Birmingham and Coventry. Under the pressure of American rivalry, they have borrowed the American system, which itself is a mere adaptation of principles long accepted in British manufactures of other sorts. It would be a grievous thing if the direct compulsion of ruin, inevitable in present circumstances, be the sole mode of transforming the respectable and almost venerable trade of Clerkenwell watchmaking into a shape habitual in other English industries, and absolutely indispensable for the perpetuation of this."

At Last!—We read that, as usual, our American cousins have put the spurt on ahead of us. A new clock has recently been run off the building stocks for the Signal Service Department at Washington. It has a one seconds pendulum, is air-tight, but should a breath-opening anywhere happen in the seams or joints of the brass case in which it is enclosed, there is an exhausting arrangement by which the pendulum may swing in a vacuum, and so tick defiance to all atmospheric changes! And furthermore, *mirabile dictu*, here comes the wonder. There is connected with the movement some electrical engineering which winds the clock up beat by beat. It being a portable instrument, a main-spring is the going motive power; but, as the electric attachment winds up at the same rate as the main-spring uncoils, the action of this spring can only extend to a few teeth of the escape-wheel; probably, only to one. The electric winding mechanism keeps exact pace with the pendulum action, the slightest deviation being shown from the standard by means of an indicator. As the whole of the pivots are jewelled, the friction is reduced to zero. We suppose that the main-spring is as peculiar as the novel features of the movement, otherwise, there may be some trouble in keeping it at its working ease with the strain-tension on it always at the maximum to keep the train in regular working order. What next, and next?—C. S. M.

The Geodetic Conference at Rome.

THE report of the Committee of the Geodetic Association, composed of Mr. Christie* for England, General Cutts for the United States, M. Faye for France, Professor Förster for Prussia, Dr. Hirsch for Switzerland, Captain Magnaghi for Italy, and Professor Rümkir for Hamburg, named to report upon the resolutions proposed by the permanent committee of the Association, regarding the adoption of an initial meridian and a universal hour, was read on the 23rd ult. before the general meeting of the Conference, and accepted, after a very animated debate; and the way is now clear for an international convention to sanction the resolutions which the Geodetists have agreed upon in favour of the Greenwich meridian.

The paragraph in Dr. Hirsch's report, in which, after considering the question of the choice of an initial meridian, he emphatically conveys the opinion of the permanent committee in favour of that of Greenwich, merits quotation:—

"It cannot be doubted that the problem should be solved in favour of the meridian of Greenwich. It is by far the most extensively used, and, from the geographical, nautical, astronomical, and cartographical points of view, best answers the two conditions required. In fact, the immense British Empire, with its 20,000,000 of square kilomètres and its 250,000,000 of population, extends over all parts of the world. Its mercantile marine numbering 40,000 ships, with a total of from 6,000,000 to 9,000,000 of tons, and an equipment of 370,000 men, surpasses in importance the *ensemble* of all other navies. It must also be added, that a great many other countries, among which the most important in respect of their mercantile marine are the United States, Germany, Austria, and Italy, equally use the Greenwich meridian in navigation, whence it may be affirmed that 90 per cent. of the navigators throughout long voyages calculate their longitudes by the meridian of Greenwich."

The following resolutions were agreed to by the special committee:—

"First, that the unification of longitudes and of hours is as equally desirable in the interests of science as in those of navigation, commerce, and international communication. The scientific and practical utility of this reform considerably outweighs the sacrifices and the trouble of arrangement to which it will put the minority of civilised nations. It should, therefore, be recommended to the Governments of all the States interested that it may be arranged and confirmed by an international convention, so that henceforth one and the same system of longitudes may be employed in all the astronomical and nautical almanacks, in all the geodetic and topographical bureaux and institutes, and in all geographical and hydrographical charts.

"Secondly, that the Conference propose to the Governments to choose for the initial meridian that of Greenwich, inasmuch as that meridian fulfils, as a point of departure of longitudes, all the conditions required by science; and that being already actually the most extensively used of all, it presents the greater probability of being generally accepted.

"Thirdly, that the longitude should be reckoned from the meridian of Greenwich, in the sole direction of from west to east.

"Fourthly, that the Conference recognises for certain scientific needs, and for the service of the great administrations of the means of communication, such as railways, steamship lines, telegraphs and posts, the utility of adopting a universal hour, side by side with the local or national hours, which will necessarily continue to be employed in civil life.

"Fifthly, that the Conference recommends, as the point of departure of the universal hour, and of cosmopolitan dates, the mean noon of Greenwich, which coincides with the instant of midnight, or with the beginning of the civil day, under the meridian situated at twelve hours, or 180 degrees from Greenwich; the universal hours to be counted from zero to 24.

"Sixthly, that it is desirable that those States which, in order to adhere to the unification of longitudes and of hours, will have to change their meridians, should adopt the new system of longitudes as quickly as possible in their observatories and official almanacks, in their geodetical, topographical, and hydrographical works, and in their new charts. As a means of transition it would be well that in new editions of old charts, on which it would be difficult to change the squares, the indications according to the new system should at least be inscribed alongside the enumeration of the old meridians.

"Seventhly, that these resolutions shall be laid before the Governments and recommended to their friendly consideration, with the expression of a hope that an International Convention confirming the unification of longitudes and of hours, may be concluded as quickly as possible by a special conference."

To these seven resolutions the special committee have added two others. The first, inserted between numbers one and two of those referred to, reads thus:—

"That, notwithstanding the great advantages which the general introduction of the decimal division of the quadrant, for geographic and geodetic co-ordination, and the corresponding expressions for time, is destined to realize, scientifically and practically, reasons eminently sound appear to justify the passing by the consideration thereof in the great measure of unification proposed in the first resolution. Meanwhile, to satisfy at the same time important scientific considerations the Conference recommends on this occasion the extension, in multiplying and perfecting the necessary tables, of the application of the decimal division of the quadrant, at least for the great numerical calculations for which it presents incontestable advantages, even if it be desired to preserve the old sexagesimal division for observations, maps, navigation, &c."

The other, inserted between resolutions six and seven, is as follows:—

"The Conference hopes that if the whole world is agreed upon the unification of longitudes and hours in accepting the Greenwich meridian as the point of departure, Great Britain will find in this fact an additional motive to take on her side new steps in favour of the unification of weights and measures, by joining the Metrical Convention of May 20, 1875."

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Taxation of Gold and Silver Plate.—Mr. R. G. Orr, of the firm of Messrs. P. Orr & Sons, Silversmiths, of Madras, is at present in this country with the object of obtaining a reform of the hall-marking laws, and the abolition of the plate duties. Mr. Orr, who has had several interviews with Mr. Cross, M.P., at the India Office, will shortly be received by the President of the Board of Trade, when the subject of the requirements of Indian manufacturers will be carefully considered by her Majesty's Government.

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* The Astronomer Royal.

Taxation of Gold and Silver Plate.

At the meeting of the Social Science Association, at Huddersfield, papers were read on the above subject, as announced in our last. We reproduce the report which appeared in the *Times*.

"In a paper upon the subject of 'Taxation of Gold and Silver Plate,' Mr. C. Mackay Smith (London) strongly condemned the fiscal and legal hindrances besetting the gold, and more especially the silver trades. He said:—Claiming that the duties, quite as much as the system of compulsory hall-marking, stand out as the one relic left to us of protective legislation, the two taken together are to be regarded as the solitary remnant of that mass of foolishness which it has been the just pride of this country to have obliterated from the statute-book within the last fifty years. Every consideration of an enlightened public policy demonstrates the necessity of abolishing this double tax, which was objectionable as being inconsistent with established views of political economy, an hindrance to the progress of the cultivation of a refined and beautiful art, and the direct cause of the expatriation of many of our most skilled artisans to a rival manufacturing country—America—where the trade could be followed under conditions more favourable to its artistic development. Such taxes had their root in that tyrannical disposition of gratuitous interference with the smaller details of daily life, so congenial to the protective spirit. Statistics showed the contemptible proportions to which the trade had fallen during the present generation. In 1855 the home demand amounted to 837,920 ounces, this, during a period of great commercial prosperity, had, by degrees, fallen to 644,832 ounces in 1883; the exports, during the same period, having fallen from 120,280 to 104,672 ounces. Had the market been unfettered, the immensely enhanced consuming power, both of the mother country and her colonies, would have much more than compensated any loss caused by the demand for the cheaper substitute—electro-plate. Silver is the currency of our Indian Empire, and the increasing supply of raw material of late years had seriously depreciated its value; any restrictions, therefore, upon the increased application of silver to trade uses was manifestly impolitic. That a majority of leading silversmiths and the Goldsmiths' Company should oppose reform was rightly to be expected. Reform had been opposed in the case of all other trades when relieved from taxation; and a City guild is perhaps not the place where one would expect any reckless novelty in the way of ideas, or any admission that a tax a century old, or a process which appears to be sanctified to their minds by the uninterrupted operation of nearly six hundred years, is an institution that the world could now lightly dispense with. Government should set aside these considerations, and Parliament should be invited to legislate, not upon the report of the Select Committee of 1878-79, but upon the evidence, including that of Sir Thomas Farrer and Mr. R. Giffen, of the Board of Trade—viz., upon the lines of perfect freedom of trade from taxation and compulsory laws.

"Mr. E. J. Watherston read a paper against the compulsory hall-marking of gold and silver wares. He said:—The duties upon gold and silver plate, together producing only £75,000 per annum to the Exchequer, should be abolished with as little delay as possible, in conformity with the recommendation of the Select Committee on Hall-making (1879). It is certain that the public attach importance to the hall-mark. A great part of the trade share this conviction. A minority of the trade attach no importance whatever to it, preferring the more modern system of a trade mark as a guarantee of their wares. Without doubt, a desire for the continuation of protection is the chief consideration of most manufacturers. Of course, this principle is disclaimed; for where in these times is the protectionist who will frankly own that he wants protection? Hall-marking of gold and silver plate should, as now prevails in the case of gold and silver jewellery, be a voluntary institution; foreign plate (like foreign jewellery) being admitted free from any legislative interference. It will be manifest to every one, with any knowledge of the beautiful work of India and America, and of its quality as respects the material, that the English public will not be much injured by its introduction for marketable purposes into this country; and as respects the manufacturer and dealer, wholesome competition, under conditions of freedom, enabling him to hall-mark his wares or not, as he may think proper, should—and, in the opinion of the writer of this paper, assuredly will—lead to a revival of one of the most ancient, as it is one of the most beautiful, of English industries; while, at the same time, it will develop a trade with India, which should become of much importance to the people of both countries.

"A discussion ensued as to whether it was necessary that hall-marking should be continued or discontinued.

"Sir R. Temple, without expressing any decided opinion, asked whether it would not be possible to separate the question of the abolition of the import duties upon manufactured silver and gold products entirely from the question of hall-marking. He believed that hall-marking in itself was honestly conducted and with scientific skill, and he suggested that the application of the test might be most beneficial. To that extent he might be said to be in favour of it, with the fee to be kept strictly moderate—so moderate as to only cover the cost; and, assuming that the practice should be maintained, he knew of no better agency by which it might be effected than the Goldsmiths' Company.

"The discussion was continued by Mr. Ross, Q.C., Mr. Haughton, and Mr. Broadbent, the last of whom directed attention to the great trade which might be opened up between England and India if the duties on manufactured gold and silver products were abrogated. This elicited from Sir R. Temple the observation that the natives of India were very anxious to get the duty upon manufactured silver abolished. They desired it for the sake of the trade solely, and not as regarded the currency, or the appreciation or depreciation of silver. As a matter of fact, they liked the depreciation of silver, because they believed, probably for a very good reason, that it greatly favoured the export trade from India in which they had so much interest.

"The President* of the department expressed the opinion that hall-marking should be purely voluntary, and that if he or any individual chose to be content with the mark by the silversmith he ought to be allowed to be so.

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Queries and Replies.

Will someone kindly state which is the correct side to put in the rivet to a fuzee chain. There is a right and a wrong even in this little item, I believe.—Bournemouth.

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A Warning to Jewellers.—A new and most singular mode of robbery has lately come into vogue in Paris, the so-called *vol à l'ail* or garlic dodge. It has happened several times that a fashionably-dressed young man has gone into a jeweller's shop, after first partaking very freely of garlic, and has asked to be shown a variety of articles, The salesman, for obvious reasons, would repeatedly look another way, and thus give our *chevalier d'industrie* the opportunity of stealing any article he chose.

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* J. E. Thorold Rogers, M.A., M.P.

A Train Timer.

Have any of the readers of this Journal heard of a "Railroad Train Timer;" or, do they know if there is such an instrument at work upon any line in this country? The invention about to be spoken of is American, but any of our leading practical horologists could, if they saw their way clear, produce something of the kind that in its simplicity and working effectiveness might successfully invite the attention of English railway companies.

Some eight or ten years ago there was a train-timer tried in the United States; but whether it became general in railway service or not we cannot say, as we have heard nothing about it since. The mechanism was described somewhat in the following manner:—

There is a locked iron box attached to one side of a carriage, which box contains a clock, and the mechanism of this clock acts upon a small drum, giving it a proper motion. Round the drum there is wound a sheet of paper, whose function it is to show the constant rate of the travelling of the drum. Next, there is fixed upon the axle, by means of rods and gearing, a pencil which is in easy contact with the drum. As the pencil, when in action, is moved with a calculated slow motion across the paper, by means of the before-mentioned rods and gearing, the drum is also moving, so that the point of the pencil marks a backward and forward diagonal line upon the paper. This paper is ruled in very small sections, every fourth line of which ruling being dotted and representing one mile. Now, let us suppose that the train goes a mile in four minutes, the pencil will carry its mark across four sections diagonally from one dotted line to the next one. If the train stops, the motion of the clock still keeps the pencil going, but, instead of crossing diagonally on the drum paper, it makes a direct crossing upon that paper from section line to section line, and as each section represents, as has been already explained, a minute of the clock, the number of minutes thus dotted shows how long the train has been in a state of rest.

In addition to all this nicety, the names of the different stations are written upon the drum-paper at the proper places for which the working of the drum is set, and by this means the exact rate of speed between any two stations, or even any point upon the journey, can be accurately noted and verified. This horo-mechanical arrangement forms a complete check upon the engine-driver; for, if he has been running too slowly, and afterwards "goes in" to make up for it by running beyond his regulated speed, not only is such running mercilessly detected, but the times, and the parts of the line where it occurred, are indisputably brought into the stern official light of day.—C. S. M.

Water Motor for Clock Work.—M. Tillac, of Tulle, has devised a drum which is divided into an equal number of cells, arranged around a central arbor. A quantity of liquid is introduced into the interior of the drum, sufficient to fill about two of the chambers, and a cord to which a weight is suspended, is rolled around the arbor. The liquid is then raised on the opposite side until equilibrium is established. The cells communicate by small orifices, near the circumference of the drum so that the liquid tends to flow constantly downward, while the weight tends to carry it upward. The amount of liquid and the weight can be so adjusted as to obtain a rotary movement as slow as may be desired.—*Les Mondes.*

Trade Notes.

The position and prospects of the English Watch Trade have at length attracted the notice of the *Times.* We propose to make some comment on the articles next month. In the meantime it is satisfactory to see that our ability to produce best watches is unchallenged.

Mr. I. Herrmann delivered his introductory lecture on Watch and Clock Making at the Young Men's Christian Institute (Polytechnic) on the evening of the 10th ult., the subject being, "Technology for Watch and Clock Makers:—A Necessity—A Power—A Source of Pleasure." As we had the privilege of occupying the chair, we can bear witness to the appreciation with which it was received by a numerous audience, and hope to hear others of the course.

Among the most conspicuous examples of the artistic manufactures of Birmingham to be seen at the Calcutta Exhibition, says the *Birmingham Daily Mail,* will be a case of best finished jewellery exhibited by Messrs. B. H. Joseph and Co., of Frederick Street. Messrs. Joseph produce nothing but the best finished work, in practical contradistinction to the wares which have, rightly or wrongly, earned the uncomplimentary designation of "Brummagem." Some of the gold and silver goods are works of art in the most literal sense. Messrs. Joseph exercise the greatest care in selecting and matching their precious gems, and the finish upon the gold work is particularly striking. Apart from the more costly gems, Messrs. Joseph have some specialities of their own, notably their renaissance silver jewellery made by the oxydising and gilding process. The card cases, fusee boxes, cigarette cases, and smelling bottles made by this interesting process are beautiful objects of art. There are some exquisite copies of the antique in silver ware, and some very fine Etruscan work. In one compartment will be shown the entire process of jewellery manufacture, from the metal in its rough state to the flattening, piercing, and stamping stages. A die will also be taken out to show the finished work. Among the curiosities of the collection is a large topaz of fine quality nearly two ounces in weight. Some of the silver brooches made by the electro-gilding process are of charming design and workmanship. The case altogether will give a good idea of the best qualities of jewellery Birmingham can produce.

Messrs. Fattorini & Sons, the wholesale jewellers and watch manufacturers, whose premises faced Kirkgate and Cheapside, Bradford, have transferred their business to much larger and more commodious premises three doors higher up the street. These premises have been fitted up with every appliance for the better carrying on of their ever increasing trade. And now the wholesale and the manufacturing departments will be carried on under the personal supervision of the members of the firm.

At the Clerkenwell Police Court on the 19th ult., Detective-Inspector Peel applied to Mr. Hosack for an order to deliver up certain parcels of jewellery, &c., which had been handed over to the Criminal Investigation Department. This property was all that had been recovered of a quantity stolen in May last from the house of Mr. John Garrett, dealer in precious stones, of Baker Street, Lloyd Square, Clerkenwell. It may be remembered, in connection with this matter, that on June 13th last, Henry Robinson was charged with breaking and entering the house of Mr. Garrett and stealing the jewellery in question, and at the same time the police produced the valuable watch of which Sir John Bennett had been robbed a short time previously, it being supposed that the prisoner had been concerned in that matter. While the case was pending the prisoner died, and Inspector Peel, therefore, now applied for an order to return the property to the owners. The inspector said there were several parcels of stones, including a quantity of garnets, topazes, and moonstones, some rough, but mostly polished. A number of parcels had been handed to him by the prisoner's wife, who was quite willing to give them up.—Mr. Ricketts, solicitor, appeared on behalf of Mr. Errington, who had purchased a number of the stones, and said his client was quite prepared to give up the property to Mr. Garrett.—Mr. John Garrett said he claimed all the property in the hands of the police. It was only a part of what was stolen from his house last May. There were also missing about £800 worth of sapphires, none of which had been found. The property recovered was to the value of about £400.—A representative of Mr. Mills, of Birmingham, said he had come to protest against delivering up the stones, which had come to him in the usual way of business.—The magistrate informed him that he would be allowed to sue Mr. Garrett afterwards if he considered himself entitled to retain the property.—Witness then expressed himself willing that the stones should be handed over, and Mr. Hosack made the necessary orders.

Trade Recipes.

To Restore Burnt Steel.—Borax, 3 ozs.; sal ammoniac, 8 ozs.; prussiate of potash, 3 ozs.; blue clay, 2 ozs.; resin, ¼-lb; water, 1 gill; alcohol, 1 gill. Put all on the fire and simmer till it dries to a powder. The steel is to be heated, dipped in this powder, and afterward hammered.

Polishing Wheels.—Take a flat burnishing file, warm it over a spirit lamp, and coat it lightly with bees-wax. When cold, wipe off as much of the wax as can readily be removed, and with your file thus prepared, polish the wheel, resting the latter while polishing on a piece of cork. The finish produced will be equal to the first buff polish, while there will be no clogging, and the edges of the arms and teeth will remain perfectly square.

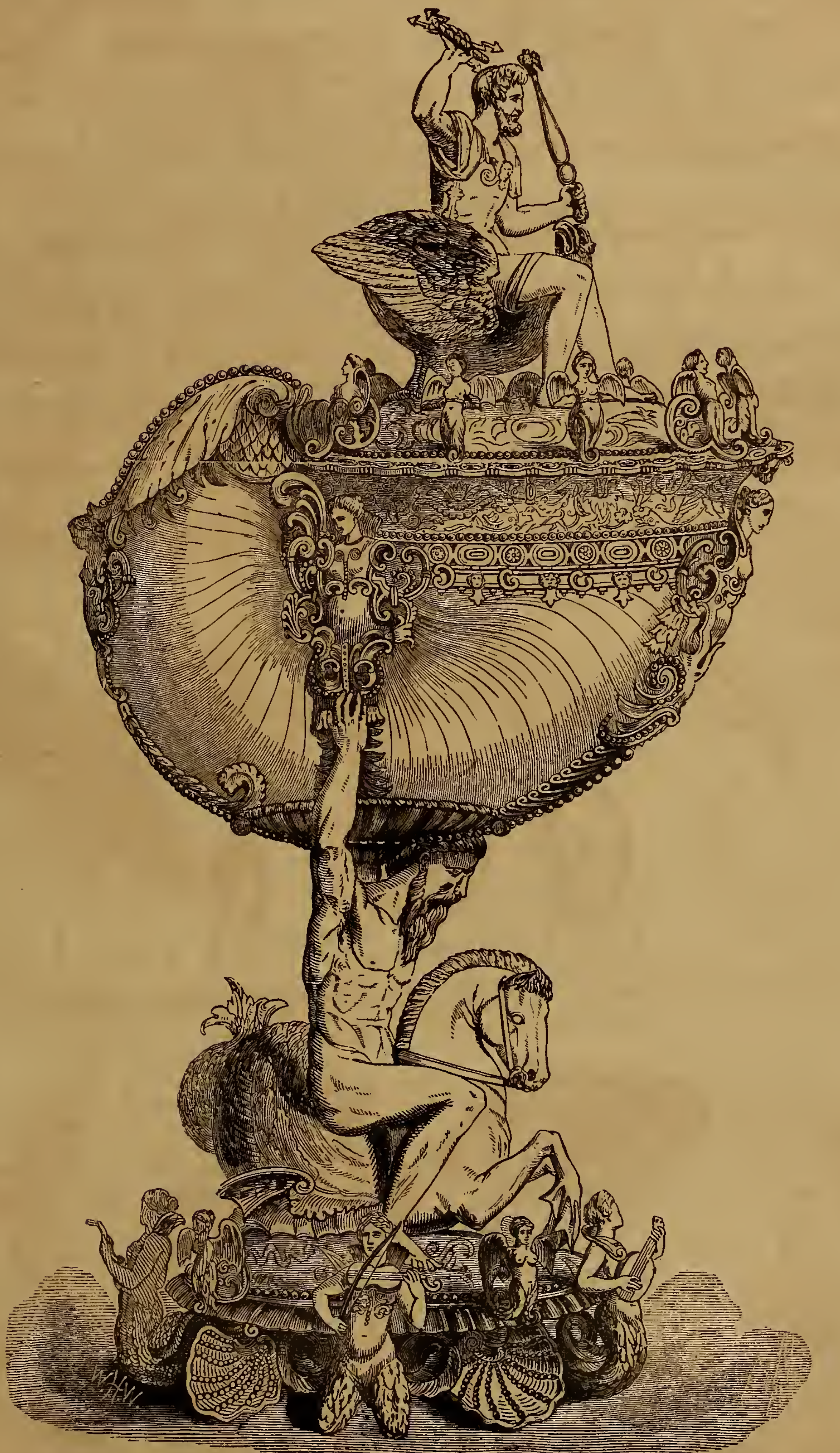
Crocus Polishing Powder.—Culinary salt and sulphate of iron (iron vitriol) are well-mixed in a mortar. The mixture is then put into a shallow crucible, and exposed to a red heat; vapour escapes, and the mass fuses. When no more vapour escapes, remove the crucible and let it cool. The colour of the oxide of iron produced, if the fire has been too high, it becomes black. The mass when cold is to be pulverised and washed, to separate the sulphate of soda. The crocus powder is then to be submitted to a process of careful elutriation, and the finer particles reserved for the more delicate work. An excellent powder for applying to razor strops is made by igniting together in a crucible, equal parts of well-dried green vitriol and common salt. The heat must be slowly raised and well-raised, otherwise, the material will boil over in a pasty state and be lost. When well-made, out of contact with the air, it has the brilliant aspect of black lead. It requires to be ground and elutriated, after which it affords, on drying, an infallible powder, that may either be applied on a strop of smooth buff leather, or mixed up with hog's lard or tallow into a stiff cerate.

An Electric Watch.

The St. Petersburg correspondent of the *Jewish Chronicle* writes:—A Jewish young man, nineteen years old, named Salomon Schisgal, and coming from Berditschew, a Jewish centre in Southern Russia, has for some time been the hero of the day in this city. In commercial circles and in journals of every shade of opinion, the current topic is the genius of Herr Schisgal, who in outward appearance is a mere youth, and no words are sufficient to praise his invention, for which he has already received a patent from Government, and which he is carrying into execution in association with one of the most influential of Russian wealthy aristocrats. This invention is a watch which goes by electricity, and with scarcely any movement; it is, therefore, simple in construction, and easy to handle; it is cheap, and above all, keeps correct time. It attracted the attention of the well known Professor of Physics at the University of St. Petersburg, Herr Chwolson (son of the renowned Orientalist of that name), who, both as a specialist and as a member of the Committee of *Savants* at the Ministry of the Interior, has written an article on the subject in the *Nowosti*, from which I extract the following particulars: 'In its remarkable simplicity this invention can only be compared with the Jablochkoff system of electric lighting. The watches are without any springs and consists solely of two wheels. Besides being true, they have the advantage of the second hand moving in single momentary leaps, as is usually the case only in very costly watches, and which is of the utmost utility for astronomical observations. These watches can also set in motion a certain number of watches of the same construction, so that they all keep exact time. The invention has convinced me that the watches can be used for the purposes of telegraphy. After naming several other advantages, Professor Chwolson describes the invention as a wonder which will cause an entire revolution in the manufacture of watches. Herr Schisgal is the son of a Jewish watchmaker in Berditschew, where he commenced his studies at the Realschule. He subsequently left for Kieff in order to enter the Gymnasium, but the anti-Jewish outrages which raged there two years ago, aroused in him a determination as it did in so many other Jewish students, to leave Russia and seek a new home in another land. But before quitting the country he resolved to thoroughly master his father's profession, and with this object in view he returned home. There, besides learning how to make watches, he occupied himself with the study of physics, and especially of electricity, and he turned his attention to the desirability of bringing the latter into relations with his occupation. This kept him engaged for about two years, until he hit upon the idea of his invention, which took him three months to work out and perfect. Several prominent persons have evinced the utmost interest in him and have made splendid offers to enter into business connections with him. From far and near, especially from military circles, he received telegrams congratulating him on having conferred so great an honour on his fatherland, the senders evidently being unaware that he is a Jew. As I have already stated, he has concluded a contract on most favourable terms with the well-known Crœsus, M. Paschkow, and he is still a minor, his elder brother has arrived here in order to complete the necessary legal formalities for the constitution of the firm. The Governor of St. Petersburg has granted the young inventor the right of residence in that city until he obtains this right, *eo ipso*, as an artisan."

Supplement to the Watchmaker, Jeweller, and Silversmith, Oct., 1883.

MONTHLY SUPPLEMENT OF DESIGNS.



THE WATCHMAKER JEWELLER AND SILVERSMITH

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ILLUSTRATED SUPPLEMENT:—Specimen Sheet from "A. Fischer's Pattern Book for Jewellers, &c."

Watch Manufacture in England.

WE intimated last month that it was our intention to make some comments on the articles which we reproduced from the *Times* on the above subject, but on further reflection find that our opinions have already been fully set forth in the series of papers bearing the title "The Future of the English Watch Trade," the first of which appeared in these pages exactly two years ago, and were supplemented by the prophetic pen of a horological Zadkiel; with whom we have not at present disagreed. It is, therefore, difficult to express the same ideas in different terms, and we are glad to be able to fall back on the following admirable letter. We may here inform our readers that we did not address any communication to the Editor of the *Times* owing to the attention required by the publication of this Journal, and the feeling of regret at being out of the discussion was entirely removed by finding that English watch manufacturers had been so ably championised—

To the Editor of the *Times*.

Sir,—Every person having a knowledge of the watch trade who read the summary and article upon this subject in the *Times* of yesterday must have admitted the interest of the former and the justness of the conclusions drawn in the latter. Unquestionably the manufacture of the cheaper kind of watches has for some time been gravitating towards France, Switzerland and America, partly on account of the more extensive use of machinery, and partly owing to the better organisation of labour in those countries. But it is important to note that England still holds the place as the producer of high-class work in this, as in other departments of manufacture, and to declare a watch to be of "English make" is still a guarantee of soundness in the eyes of a purchaser. "The million" may be supplied, and may be satisfied with a machine-made watch, which they can obtain at prices ranging from 30s. to £5, but the man who looks upon his watch as a sort of friend, and desires to keep it a lifelong companion, will no more be satisfied with your machine-made article than a true sportsman will be satisfied with a machine-made fowling piece, and for the same reason, viz., that he has his own idea of what a watch or a gun should be, in point of size, weight, make, and a dozen other particulars, and he will gladly pay the price necessary to secure the article he requires. Nor is his fastidiousness in this respect irrational, for every watchmaker who has had anything like a large experience can testify to having had watches through his hands made 50 and even 100 years ago, which, as timekeepers, will hold their ground against the modern machine-made watch. England may not be keeping pace with other nations as a producer of cheap articles, but those who want a thorough piece of workmanship, whether in the shape of a tool, a gun, or a watch, must still come to her and pay her price.

I am, Sir, your obedient servant,

30, Cornhill, E.C., Oct. 24. J. Sewill.

Mr. E. J. Watherston wrote on the advisability and necessity of abolishing the present compulsory system of Hall-marking watch cases, in order to enable a similar class of goods to be made here as those imported from abroad, while, on the other hand, Messrs. Gibson and Langman, of 112, Regent Street (The Manufacturing Gold and Silversmiths' Company) as strongly advocated its retention.

We also publish a letter from Messrs. Robbins and Appleton, written in their usual forcible style :—

Waltham Buildings,
Holborn Circus.
London, November 9th 1883.

Sir,—We note you propose in December issue, to refer to the *Times* articles on watchmaking.

Assuming that you will have something to say about "Waltham," we trust, in your remarks, you will distinctly separate "American watches" from those so-called "Americans" whose origin is in France and Switzerland."

On page 64 of this month's journal we note a "valued correspondent" writes, "Our great trouble is with rotten keyless, common Americans and Genevas."

We emphatically protest against such unfairness. "Common Americans" your correspondent ought to know are Swiss or French through and through ; the vast mass of such goods are mostly imitations of our models. Call them Franco-Swiss-Americans if you like, but don't father such trash on us.

Yours very respectfully,
Robbins and Appleton.

It is evident that our correspondents claim the exclusive use of the term "American Watch" as a trade mark, and take upon themselves to defend the national manufacture against all comers; but even admitting, for the purposes of argument, that they are justified in so doing, it is surely going too far to say there are *no* common American watches, and by inference, that the comparative terms of good, better, and best, are alone to be made use of in referring to the productions of the American factories.

Our own acquaintance with watches made in America has been very limited; but without going into special details, we may say that the few specimens which have come into our hands in the way of business have *not* emanated from Waltham, and should occasion arise, we hold ourselves at perfect liberty to criticise any "American watch" without necessarily being supposed to be taking up an antagonistic position to Messrs. Robbins & Appleton.

On one point, viz., that of the trashy nature of some of the foreign imitations of American watches, whether Waltham or otherwise, we are quite in accord with them, and are pleased to have the opportunity of saying so; for some five years ago, in a misguided moment, we personally undertook to revise a number of such watches to oblige an acquaintance who had had some difference with his "practical man," the result being that we felt considerable sympathy for the said individual, and class our attempts to correct their defects among "those things which we ought not to have done." It is possible that the discussion will not close here, but we fail for the present to see wherein the "unfairness" lies as stated by Messrs. Robbins and Appleton.

A New Digression in "Horological Humbug."

OURS are "times of marvel." We hear of nutmegs which grew without trees ; eggs, formed without fowls, and creations of all sorts of provisions from chemical chaos. There was a time when "there was no royal road to learning," but we may expect soon to hear that some "short cut" has been opened in this direction. At one time, not so very remote, men were at the trouble to prove some amount of proficiency in their respective trades before they could expect to be able to boast of royal patronage ; but, thanks to our refined commercial morality, candidates for coats of arms are quite independent of such pernicious "craft-puritanism," in our trade at least; on the contrary, workmanship has a tendency to foster consciencious scruples, which would more likely be a hindrance than a factor for success in this direction.

On the Continent, however, they appear to live under still more favourable conditions, for, according to a report in the *Oestreichisch-ungarische Uhrmacher Zeitung*, a society has started at Naples, called the "Sociéte d' Incorragiomente," by the aid of which gold and silver medals for scientific or technical merit and distinctions can be obtained without the irksome method some narrow-minded bigots have imposed on the votaries of honours of this kind, and as easy as appointments to crowned heads, in England.

Thus it appears that a certain Wilhelm Hechte, who has been in turns glass and china and picture dealer, manufacturer of looking-glasses, clothier, hosier, vendor of patent medicines, and last, but not least, a watch and clockmaker has been decorated with a gold medal of the first class, and raised to honorary membership, for his "Services for the advancement of Industry." The chief distinction that this favoured individual can boast of as regards actual merit in his service to any trade in which he dabbled, is his proficiency in advertisement literature. Probably this Society, may be got up by advertisement agents, who measure merit according to the square inch, for, according to our authority, that is all that can be said of this gold medallist whom this precious society delighted to honour. Probably such a society would find many worthy of distinction among London advertisers to the public, and especially such who display their talents for "puff" in the religious Press. These men, who have such wonderful articles to offer in the way of horological productions, must evidently be under the delusion that charity and a religious sentiment are synonymous, and as it is said that "Charity believeth all things," they conclude that religious readers can be gulled to any degree. Indeed, there is a very close analogy between this Neapolitan Society and editors of these professed religious organs, in the fact that the latter will occasionally give their best man according to the square inch a "Leader."

Is such the outcome of nineteenth-century education, or is it one grand flicker of technical cant before it expires? We hope, in the interest of the Trade we advocate, it is the latter, and that if a "Society of Encouragement" of the above character should raise its head in London, and in the Trade, it would be put in the pillory of the public Press.

Correspondence.

TO THE EDITOR OF THE "WATCHMAKER, JEWELLER, AND SILVERSMITH."

Assay Office, Goldsmiths' Hall,
London, *September*, 1883.

Sir,—I send herewith for your information a Print of Section 10 of "The Revenue Act, 1883," which effects certain alterations in the manner of dealing with Gold and Silver Plate imported into this Country.

I am, Sir, your obedient servant,
Walter S. Prideaux, Clerk.

And whereas by the statutes now in force relating to gold and silver wares, it is enacted and provided that gold and silver plate, not being battered, which shall be imported into the United Kingdom of Great Britain and Ireland, and sold, exchanged, or exposed to sale within the said United Kingdom, shall be of the respective standards now required for any ware, vessel, plate, or manufacture of gold or silver wrought or made in England; and that no gold or silver plate so imported as aforesaid, not being battered, shall be sold, exchanged, or exposed to sale within the said United Kingdom, until the same shall have been assayed, stamped, and marked, either in England, Scotland, or Ireland, in the same manner as any ware, vessel, plate, or manufacture of gold or silver wrought or made in England, Scotland, or Ireland respectively, is or are now by law required to be assayed, stamped, and marked. And that in order that gold and silver plate so imported as aforesaid may be assayed, stamped, and marked, it shall and may be lawful for any person to send the same to any assay office in the United Kingdom at which gold and silver plate is now by law required to be assayed, and when so sent it shall be assayed, tested, stamped, and marked in such and the same manner as if the same were British plate by law assayable in such office, but with the addition of the letter F, and that if any gold or silver plate so imported as aforesaid and so sent to any such assay office as aforesaid, shall on being assayed at such assay office be found or discovered to be of coarser alloy than the said respective standards, such gold or silver ware shall be cut, broken, and defaced at such assay office.

And whereas it is desirable to secure with more certainty the marking of all gold and silver plate of standard quality imported into Great Britain or Ireland to be sold, exchanged, or exposed for sale, and also to make provision for allowing the exportation of imported plate of coarser alloy than the said respective standards:

Be it enacted,—

1. That all gold and silver plate imported into Great Britain or Ireland shall be entered to be warehoused, and shall be deposited in a bonded warehouse, and no such plate shall be delivered for home use until assayed, stamped, and marked according to law.
2. That for the purpose of assay, such plate may upon such notice to the proper officer of customs, upon such security for the payment of duty, and subject to such regulations as the Commissioners of Customs may from time to time prescribe, be removed from the warehouse in charge of an officer of customs by the importer and at his risk, to, and be delivered into the hands of the officers of the assay office nearest to the port of importation.
3. That upon previous payment by the importer of the expense of assay, the officer of the assay office shall assay the plate and shall give notice of the result of such assay to the proper officer of customs, and to the importer.
4. If such plate shall be found upon assay to be of standard quality, it may thereupon be cleared for home use, and the officer of the assay office upon production of a certificate from the proper officer of customs that the duty and all proper charges have been paid, shall stamp, mark, and deliver the plate to the importer.
5. If such plate shall be found upon assay not to be of standard quality, it shall not be cut, broken, or defaced at the assay office, but shall, upon such notice and under such regulations as the Commissioners of Customs shall from time to time prescribe, be removed from the assay office in charge of an officer of customs by the importer and at his risk, and be returned to the warehouse.
6. All plate returned to the warehouse after assay may within one month from such return be exported by the importer under such conditions and upon such security as are prescribed by the Customs Laws in relation to the exportation of warehoused goods.
7. After the expiration of one month from the return of any plate to the warehouse, or sooner if the importer shall desire it, any part thereof not exported shall be cut, broken, and defaced by the proper officer of customs, and shall be delivered free of duty upon payment of all proper charges.
8. Actual deposit of plate in a warehouse under this section may, with the approval of the Commissioners of Customs, be dispensed with in cases in which the plate can be and is removed direct from the place of examination to the assay office, but plate so removed direct shall, nevertheless, for the purposes of this section be deemed to have been actually deposited.
9. The notice from the officer of the assay office of the result of the assay above referred to in this section shall be a notice prescribed by the Commissioners of Customs, and as regards the importer, shall be posted to an address to be stated by him on depositing his plate at the assay office.
10. In this section the words "proper charges" shall mean all such charges as the Commissioners of Customs, with the approval of the Commissioners of Her Majesty's Treasury, shall make for attendance of officers or otherwise. Where plate is removed to an assay office in pursuance of this section, within one month after entry, the rates for warehousing under the customs Tariff Act, 1876, shall not be charged.
11. Articles of plate exempted from assay in the United Kingdom are not subject to the provisions of this section.
12. Plate imported for private use and not for sale shall also be exempted upon proof by statutory declaration referring to this section being furnished to the satisfaction of the commissioners of Customs that such plate is not intended for sale or exchange.
13. But in case any such plate shall at any time thereafter be taken to an assay office to be assayed, and shall be found upon assay not to be of standard quality, such plate shall be deemed to be plate removed from a warehouse for assay under this section, and shall be dealt with accordingly. Plate taken to be assayed under this sub-section shall be identified to the satisfaction of the proper officer of the assay office.

[We have published the foregoing *in extenso*, and refrain from comment at present, but we may state that it is considered highly probable that some of the clauses will undergo considerable modification on account of the inconvenience entailed upon the public.—Ed.]

The New Time Standard for America.

A Boston correspondent wrote us on October 28th as follows:—

"As you may have heard, America has decided to abandon the old time standard, the Sun, and adopt a new one, called "Railroad Time;" and as the subject may prove of interest to the readers of your Journal, I enclose some newspaper cuttings which will give you the full particulars. I fear that the use of Greenwich minutes and seconds for local time on our sea coasts will not improve the chronometer business, as it may induce captains to keep their chronometers on board, and rate them themselves instead of sending them ashore."

From the materials before us we have selected the following, which appeared in the *Boston Globe*, of October 14th:—

Change of Public Time.

The Time Ball and Public Clocks to be adjusted according to the New Railway System.

The question of time with railroads running long distances, and especially those going in the main east and west, has always been a very serious one. While the public time, being regulated by the motion of the sun, must necessarily differ in different places, railroads have been obliged to preserve some uniformity, but the matter was never satisfactorily settled until the Railroad Time Convention met at Chicago on Thursday last and agreed to adopt a system of hourly meridians, not establishing a system of arbitrary meridians, but fixing upon important stations or termini that correspond approximately in position to the time meridians. It seems highly desirable that the public time should be made to conform to this system, especially as such a change would be attended by no inconvenience, and the new time would in no case differ more than half an hour from the actual time of any place. Under the influence of the Cambridge Observatory, Boston has taken the lead in announcing her determination to make the public time conform to that of the railroads. Other cities should take action on the matter at once. The change for such cities as Erie, Pittsburg and Detroit, which are on the border line, will be greater than for Boston, New York and Philadelphia; but it is in these very cities that the confusion at present is greatest, and they will be immensely benefited, as will Springfield, from which city roads running by Boston, New York, and New London time centre. The correspondence, which is given below, between officers of Cambridge Observatory and the Board of Fire Commissioners, on the subject, is of considerable interest.

Harvard College Observatory,
Cambridge, U. S., October 13, 1883.

Gentlemen,—Your letter of October 9 to Mr. J. Raynor Edmands, in charge of the time service of this observatory, was duly received. Please accept my thanks for this kind expression of your readiness to make the noon bells and the public clocks of Boston conform to the time of the 75th meridian in case of the adoption of that time in the clock signals sent from the observatory. Since the receipt of your letter the Railway Time Convention, at its meeting, October 11, in Chicago, has adopted the system of hourly meridians by an almost unanimous vote, representing the United States and Canada. Assurances have been given by the railroads leading out of Boston that they will adopt the system if the Boston time-ball shall be dropped by the observatory at 12 o'clock (noon), according to the new standard. The general adoption of this standard time will bring the minute-hands of time pieces all over the country into coincidence with each other, and with those of the chronometers used by navigators to indicate Greenwich time. This uniformity will be secured without producing a disagreement of much more than half an hour, between the time in use at any place and its local time. The observatory has been enabled by the letter from you above mentioned to announce to the Railway Convention that all the public time in Boston would conform to that of the railways, and thus to place the city of Boston and the observatory in the position of pioneers in the movement to secure uniformity between public and railway time. As Sunday, November 18, is the date which has been selected for the change of time by the the trunk lines and the Western lines of railway, I take pleasure in informing you that on and after noon of that day the time signals used by the observatory will coincide with the minute and second of Greenwich mean time. The hour is to be 15 minutes 44·5 seconds later than the corresponding hour of Boston mean time, and exactly 5 hours later than that of Greenwich. The same hour will be used in Canada, throughout the provinces of Quebec and Ontario, in New England, in the Middle States (except the western part of Pennsylvania) and in the Southern States of Maryland, Virginia, West Virginia, North and South Carolina.

Yours respectfully,
Edward C. Pickering.

To the Board of Fire Commissioners, Boston, Mass.

Boston, October 13, 1883.

To Edward C. Pickering, Esq.,
Harvard College Observatory.

Dear Sir,—The Fire Commissioners have received your letter of this date informing them that the Railway Time Convention, at its meeting in Chicago, October 11, has adopted the system of hourly meridians; that Sunday, November 18, has been selected by the Convention and adopted by the observatory as the date when the new noon time will go into effect. I am requested by this board to state to you that on the above date and thereafter the noon blow on the bells and gongs connected with the fire alarm office will be struck in conformity to the new time as furnished by the observatory, and also that the public clocks will be adjusted to correspond with the same.

Yours respectfully,
John E. Fitzgerald,
For the Board of Fire Commissioners.

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THE GREENWICH TRIAL FOR 1884.

TO THE EDITOR OF THE "WATCHMAKER, JEWELLER, AND SILVERSMITH."

Royal Observatory, Greenwich,
November 3, 1883.

Sir,—I beg to acquaint you, for the information of chronometer makers, that the last day for the deposit of chronometers at the Royal Observatory for the forthcoming Annual Trial will be Monday, January 7, 1884. Chronometers will also be received, for the Annual Trial, on any day of the preceding week.

Applications for permission to send chronometers for trial must be made to the Hydrograper, Admiralty, London, S.W., not later than December 20.

I am, Sir,
Your obedient servant,
W. H. M. Christie.

A New Watch Regulator.

Messrs. Alfred Russell and Co., of Liverpool, have sent up for inspection a new form of watch regulator, and it is attached to as fine a specimen of horological art as the most fastidious eyes need look upon. The watch, itself, is a 16-size, ¾-plate, keyless. The escapement is of the usual English first-class lever type, with pointed 'scape-wheel teeth, and has a compensation balance; is ruby-jewelled in five pairs; Brequet spring; the train-beat is 16,200. It is in a gold crystal case, and looks peculiarly attractive. The regulating arrangement may be briefly described to be as follows:—

The principal part is formed of a steel arm terminating at one end in the centre of a steel quadrant, which quadrant has its outside edge cut into very fine teeth. Taking into this quadrant is a small steel disc whose circumference is also toothed to the same number as the quadrant. What we may call the ring of the arm fits on the endstone-cap in the usual way, having the curb-pins underneath. Turning round to the front we find a half-circle on the upper side of the dial, which half is marked from zero under the XII. into fifteen divisions on each side. That on the right is for "Fast," whilst that on the left is for "Slow." Every fifth division has a mark of double length to the others. We presume that each mark is intended to indicate a gaining or losing rate of a minute a day; but upon second thoughts that can hardly be so, and if we fix upon five seconds a day, which is about as fine as any balance-spring can be set to, we may be nearer the mark. When it comes even to that minimum, we must, as all makers know, fall back upon the timing-screws. In conjunction with this half-circle is the index-finger lying closely upon the division marks, and fixed on an arbor beneath the hands, but passing through the same hole as the hands in the dial. The action as thus: Upon the left-hand side of the pendant is a pin-stud exactly like that of the ordinary setter for the hands of a keyless watch. When is is pressed down it causes a pinion under the pillar-plate to take into the lower end of the steel disc already mentioned, and whose teeth are always in contact with the quadrant, then by turning the winding-button the index-finger on the dial can be moved to any division, or any hair-breadth fraction of a division that the skill of the operator can manage. The great value of this form of regulator is, that it can be moved without opening the case in any way, just the same as the hands of a keyless watch can be so set. To many persons that will be a weighty consideration in determining their choice. There is this to be said, however, that if all the instruments are of the same high quality as the one before us appears to be, the regulator will have an easy time of it. In the hand-setting there is a little alteration in using the button, but otherwise the working is much as usual. We have been assured that the principle is thoroughly sound, endurable, and can be safely confined in; furthermore, that it has been tested far beyond what is likely to occur in actual wear, and has given the most satisfactory results.

C. S. M.

A Simple Method of Taking Sidereal Observations.

By B. Rösch.

From the "Deutsche Urmacher Zeitung."

Take a plain piece of tin, make a hole through it of about 2 to 3 mm. diameter, and then fix it projectively to the side of the window. If celestial objects are observed through this hole, we shall soon find that they all move in one direction, and this observation is the more readily made if it is taken relatively to some terestrial object, such as a house, or tower, etc. If any such terestrial object is about 1,000 metres distant from the observer, it will be found that the star disappears instantaneously.

If the time of such disappearance is noted, it will be found that the appearence or disappearance of the same star happens at the same instant according to sidereal time. But as sidereal time is faster than mean time, with which our clocks and watches are approximately in harmony, the watch or clock by which the observation is made should be losing 3 minutes 55·907 seconds each day, or in 10 days $= 10 \times 3'55{\cdot}907'' =$ 39 minutes 19 seconds. If the difference is greater, the watch or clock loses, if less, it gains.

After a longer interval the appearance of the star will take place at daylight, when the observation is no longer possible, hence another star has to be selected. It is quite immaterial what star is taken, so long as it is not a planet, the motion of which is irregular, and therefore not serviceable for the object in question.

By this method the normal clock can be accurately regulated, and after the disappearance of the star is compared with the time signalled from an observatory, then we can note this as local time all through the year.

For my observations I use a small astronomical telescope, with a thin piece of balance-spring fixed diametrically across the focus. This telescope is made a fixture by the side of my regulator, but so that by means of a compass point, it admits of a small angular displacement in a vertical direction, so that it can be directed to a fresh star when occasion requires it. So long as one star can be observed, the telescope remains fixed.

When I am about to take an observation, I place myself before the telescope a few minutes before the time. When the star arrives in the field of vision I observe the time in seconds on the regulator, then continuing the observation, I count the time by the beats of the pendulum.

The star approaches the spring rapidly until it is covered by it. The moment that it does so is quickly noted and the observation is continued. In 34 seconds the star appears on the other side of the spring, the moment of which is noted again. The disappearance and re-appearance is so quick that they can be noted with great certainty, and even if an error of a second should be made, the effect is halved by the double observation. By this method an error of a second is scarcely possible, and it is therefore desirable that it should be more extensively practised.

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A large church clock has just been erected at Wenvoe Church, near Cardiff. It is fitted with all the latest improvements, strikes the hours upon a large bell, and has one four-feet dial. Messrs. John Smith and Sons, Midland Clock Works, Derby, have carried out the work.

Proposed Technical School for Coventry.

A public meeting of the citizens of Coventry, convened by the Mayor in response to an influentially signed requisition, was held in St. Mary's Hall, on the evening of the 21st ult. The Mayor (A. S. Tompson, Esq.) presided, and was supported by the leading gentlemen connected with the staple industries of the locality. Our space this month will only permit a very brief notice of the proceedings, giving especial prominence to the watch trade. Mr. John Rotherham took the lead, in promising to give £250 towards starting the school, and also guaranteed £50 a year for five years, towards the expenses. Mr. Philip Magnus, secretary to the City and Guilds Institute wrote, expressing his warm sympathy with the movement, and while holding out no hopes of being able to obtain immediate assistance for it, promised to take charge of any application which might be made. The Mayor promised £100, and an annual subscription of £20 for five years; Mr. A. Rotherham, £50, and an annual subscription of £10 for the same period. The other promises of donations amounted to £190 5s., and the subscriptions to £21 9s., making the aggregates £590 5s. and £101 9s. respectively. The speech of Mr. A. Fridlander, in reference to the watch trade, as reported in the *Coventry Herald*, will appropriately terminate this paragraph. We heartily wish success to the proposed scheme, and regret that we were unable to be present at the meeting.

Mr. A. E. Fridlander, in seconding the resolution, said that as regarded the watch trade, he felt he was keeping well within bounds when he said that its very future was dependent upon technical education. A few weeks ago there appeared an important article on watchmaking in the London *Times*, which probably many of those present had read, and, although certain errors had crept into that article, it nevertheless dealt very fairly with the matter as a whole. It was a sad fact that Coventry could no longer supply a very cheap watch for the million. In this matter they could not compete with the cheaper labour of Switzerland, they could not, and he thought he might say they would not, compete with that "make or break" system which certainly did characterise the commencement of American adventures. It was not absolutely necessary that they should compete with those countries as regarded price, for he felt certain that if Coventry would only secure for its watches the same good name that it had for its bicycles and tricycles, they would have very little to fear from the productions of foreign competitors. (Applause.) He felt certain that everyone would prefer to have a good sound English watch if he could get it, even if he had to pay a little more for it; but they did want, and they must have, improvement. (Hear, hear.) A technical school was required, in order that the workmen might be taught to make the most of their brain-power—(Hear, hear)—that they might bring theory to bear upon practice, because he was sure it was through that, and that alone, that they could hope to see progressive improvement in the manufacture of that little piece of living mechanism, a watch. (Hear, hear, and applause.) He felt justified in stating that no other place in the whole world had ever produced better finishers or escapement makers than Coventry—(applause)—but they failed in the one essential. He dare venture to assert that there were not six men in Coventry who theoretically understood the springing of a watch. With careful training, however, that very important operation might be understood, and become as simple as it was for a musician to understand how to play correct, instead of incorrect, notes upon a piano. This point was but one of many which he could urge in favour of the subject before the meeting. There were other points in connection with a watch or clock, such as synchronising, compensating, and adjusting, without which no watch or clock could be rendered a perfect timekeeper, which were unknown, or almost unknown, to many connected with the trade, and himself certainly amongst the number. This knowledge could only be acquired by very careful study and patient perseverance in teaching. As this was but one trade out of many that would be benefitted by such a school as was in contemplation, it behoved Coventry to spare no effort to secure the success of an undertaking which would be of so much commercial and social importance, not only to themselves, but to those whom they served, and to those who would follow them.

Since writing the above we have had the opportunity to converse on this important project with a representative member of the Coventry watch trade, and were pleased to hear that very satisfactory progress has already been made in the movement; a sum of £7,000 has already been subscribed, ample testimony that the interest shown is of a practical kind. More on this subject on a future occasion; for the present we wish it all the success it merits.

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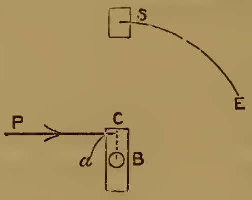
NOTES FROM J. HERRMANN'S LECTURES ON "WATCH AND CLOCKMAKING."

TO THE EDITOR OF THE "WATCHMAKER, JEWELLER, AND SILVERSMITH."

Sir,—Seeing that a controversy has sprung up in a contemporary, I place the following, which has reference to the matter under discussion, at your service, should you think it worthy of a place in your pages and of sufficient relative interest to your readers.

Yours, &c.,
J. Herrmann.

Let B represent the centre of motion of the balance, C the point of attachment of the inside coil to the collet, and S the balance-spring stud. C *a* represents a small section of the inside coil, and S E of the last coil Also let P be the elastic force of the balance-spring, and P C its direction of action when C is in the line B S.



It is a matter of fact, which can be verified in any watch with a flat spring, that the coils between C and S move in a straight line, whose direction is the perpendicular to B S, and that the coils lying on the opposite side to S have a compound motion, one axis of which is parallel to B S and the other to P C, hence the momentum of P about B is proportional to B, *sine* P C B.

But P C B is least when C is on the opposite side to S, and varies inversely as the length of the spring.

Therefore, if C is the position of the point of attachment when P = O, then the momentum of P C B is at a maximum during short arcs and at a minimum during long arcs, for when vibrating a turn C will be opposite to S at the end of every vibration, and the direction of P C will vary from a right angle with C B either in difference or excess inversely as the length of the spring, and hence equal coils and short springs make the acceleration of the shorter arcs greater than the long ones. This conclusion is in harmony with experience, as it should be.

New Patent Law and Registration of Designs.

PATENTS.

The Act to amend and consolidate the law relating to patents for inventions, registration of designs and trade marks, will come into operation 1st January 1884. It repeals wholly or in part no less than twenty-three statutes, and by simplification of procedure and reduction of fees effects great changes. Although the Act provides for certain alterations in the existing laws of trade marks and designs, the following remarks are confined to the one subject of patents for inventions. There has been no substantial alteration in the Patent Laws since the Act of 1852, although numerous Bills have been introduced into Parliament by the various Governments and private members. The amendments now effected are, to a very considerable extent, those recommended by the Committee of the House of Commons in 1871. The main alterations effected as regards the law of patents are as follow:—The Government fees on application for provisional protection are reduced from £5 to £1; and the Government fees for completing the patent for the first term (four years in place of three as at present) are reduced from £20 to £3, so that the patent will be granted for a term of four years for a sum of £4. There is no alteration in the amount of the subsequent payments for the extension of patents from four to fourteen years, but in place of paying the £50 and £100 duties in lump sums at the end of the third and the seventh year, these sums are now payable at the option of the patentee, either in one sum of £50 at the end of the fourth year, and one sum of £100 at the end of the eighth year, or by annual payments of £10 before the end of the fourth, fifth, sixth, and seventh years; £15 before the end of the eighth and ninth years; and £20 before the end of the tenth, eleventh, twelfth, and thirteenth years. Patents will be granted to the inventor jointly with others, but the inventor must in every case make a declaration that he is the true and first inventor. Applicants for patents may, if they so think fit, transact all their business with the Patent Office by post, and the various post-offices throughout the country are to keep on sale the stamped papers required in applications for patents. Each application for a patent is to be confined to one invention only. The procedure on application is as follows:—The inventor must lodge at the Patent Office a declaration and provisional specification. These documents, in place of being referred to the law officers for examinatiom, are to be referred to an examiner. The examiner's duties are to see that the provisional specification fairly describes the invention, and to see that the title of the invention sufficiently indicates the object of the invention. The examiner has also to report to the comptroller (the officer at the head of the Patent Office) whether the application conflicts with any other unsealed application in the office. The provisional specification having been approved, the applicant must then prepare his final specification, and lodge it at the Patent Office within nine months from the date of application. This specification is again referred to an examiner, who has to ascertain that the specification is properly prepared and is consistent with the provisional specification. The examiner, in the cases of both provisional and complete specifications, is to report to the comptroller. If the applicant is dissatisfied with the decision in either case, he can appeal to the law officers. If the complete specification be not accepted within twelve months from the date of application, the application is to become void. The patent is sealed after the final specification has been passed by the comptroller. The provisional specification remains secret until the complete specification is filed, but after that both provisional and complete specifications are to be open to public inspection. Specifications may be amended by way of disclaimer, correction, or explanation. The comptroller is to decide upon all applications of this nature, there being an appeal from his decision to the law officers. A very important provision is also introduced for the purpose of enabling the patentee to disclaim, by leave of the judge, during the progress of an action, and without stay of proceedings. The Board of Trade has power to grant compulsory licenses in default of the patentee granting licences on reasonable terms, and on proof that (*a*) the patent is not being worked in the United Kingdom; (*b*) the reasonable requirements of the public are not supplied; (*c*) any person is prevented from working or using to the best advantage an invention of which he is possessed. The jurisdiction of the Privy Council in cases of prolongation of patents is retained, but the almost obsolete power given to the Privy Council to confirm patents is not re-enacted. The action of *scire facias* is abolished, but revocations of patents may be obtained on application to the Court. The right of the Crown to the free use of patented inventions is abolished, but the Crown is to be at liberty to use patented inventions on terms to be settled by the Treasury. In all legal proceedings with respect to patents the Court may, and at the request of either party shall, call in the aid of an assessor. Letters patent may be granted to the personal representatives of deceased inventors. The clause of the Patent Law Amendment Act, 1852, by which the British patent lapsed with the expiry of any foreign patent of anterior date, is not re-enacted. The provisions as to the registrations of documents at the Patent Office, the printing and publication of specifications, and the preparation of indexes and abridgments are not substantially altered. The comptroller is to issue an illustrated journal of patent inventions as well as reports of patent cases, and is to keep this journal and complete specifications of all patents in force on sale. Power is taken to join the International Union for the reciprocal protection of patents, and when this is done the anterior publication of a foreign specification will not (for a limited time) affect the British application.

DESIGNS.

The Comptroller of the Patent Office may, on application by or on behalf of any person claiming to be the proprietor of any new or original design not previously published in the United Kingdom, register such design. The application must be made in the form set forth in a schedule to the Act, or in such other form as may be from time to time prescribed, and must be left at, or sent by post to, the Patent Office. The application must contain a statement of the nature of the design, and the class or classes of goods in which the applicant desires that it be registered. The same design may be registered in more than one class. In case of doubt as to the class in which it ought to be registered the comptroller may decide the question. The comptroller may, if he thinks fit, refuse to register any design presented to him for registration, but any person aggrieved by any such refusal may appeal therefrom to the Board of Trade. The latter body shall, if required, hear the applicant and the comptroller, and may make an order determining whether, and subject to what conditions, if any, registration is to be permitted.

On application for registration of a design the applicant shall furnish to the comptroller the prescribed number of copies of drawings, photographs, or tracings of the design, or the applicant may, instead of such copies, furnish exact representations or specimens of the design. The comptroller may, if he thinks fit, refuse any drawing, photograph, tracing, representation, or specimen which is not, in his opinion, suitable for the official records.

The comptroller shall grant a certificate of registration to the proprietor of the design when registered. The comptroller may, in case of loss of the original certificate, or in any other case which he deems it expedient, grant a copy or copies of the certificate.

When a design is registered, the registered proprietor of the design shall, subject to the provisions of the Act, have copyright in the design during five years from the date of registration. Before delivery on sale of any articles to which a registered design has been applied, the proprietor must (if exact representations or specimens were not furnished on the application for registration), furnish to the comptroller the prescibed number of exact reprsentations or specimens of the design; and if he fails to do so, the comptroller may erase his name from the register, and thereupon his copyright in the design shall cease.

Before delivery on sale of any articles to which a registered design has been applied, the proprietor of the design shall cause each such article to be marked with the prescribed mark, or with the prescribed word or words or figures denoting that the design is registered; and if he fails to do so the copyright in the design shall cease, unless the proprietor shows that he took all proper steps to ensure the marking of the article.

During the existence of copyright in a design, the design shall not be open to inspection except by the proprietor, or a person authorised in writing by the proprietor, or a person authorised by the comptroller or by the court, and furnishing such information as may enable the comptroller to identify the design, nor except in the presence of the comptroller, or an officer acting under him, nor except on payment of the prescribed fee; and the person making the inspection shall not be entitled to take any copy of the design, or of any part thereof.

When the copyright in a design has ceased, the design shall be open to inspection, and copies thereof may be taken by any person on payment of the prescribed fee.

On the request of any person producing a particular design, together with its mark of registration, or producing only its mark of registration, or furnishing such information as may enable the comptroller to identify the design, and on payment of the prescribed fee, it shall be the duty of the comptroller to inform such person whether the registration still exists in respect of such design, and if so, in respect of what class or classes of goods, and stating also the date of registration, and the name and address of the registered proprietor.

If a registered design is used in manufacture in any foreign country, and is not used in this country within six months of its registration in this country, the copyright in the design shall cease.

There shall be kept at the Patent Office a book called the "Register of Designs," wherein shall be entered the names and addresses of proprietors of registered designs, notifications of assignments and of transmissions of registered designs, and such other matters as may from time to time be prescribed. The register of designs shall be *primâ facie* evidence of any matters by this Act directed or authorised to be entered therein.

There shall be paid in respect of applications and registration such fees as may be from time to time, with the sanction of the Treasury, prescribed by the Board of Trade.

The exhibition at an industrial or international exhibition, certified as such by the Board of Trade, or the exhibition elsewhere during the period of the holding of the exhibition, without the privity or consent of the proprietor, of a design, or of any article to which a design is applied, or the publication, during the holding of any such exhibition, of a description of a design, shall not prevent the design from being registered, or invalidate the registration thereof, provided that both the following conditions are complied with, namely:—(*a*) The exhibitor must, before exhibiting the design or article, or publishing a description of the design, give the comptroller the prescribed notice of his intention to do so; and (*b*) the application for registration must be made before or within six months from the date of the opening of the exhibition.

During the existence of copyright in any design, it shall not be lawful for any person, without the license or written consent of the registered proprietor, to apply such design or any fraudulent or obvious imitation thereof, in the class or classes of goods in which such design is registered, for purposes of sale to any article of manufacture or to any substance artificial or natural, or partly artificial and partly natural; and it shall not be lawful for any person to publish or expose for sale any article of manufacture or any substance to which such design or any fraudulent or obvious imitation thereof shall have been so applied, knowing that the same has been so applied without the consent of the registered proprietor.

Any person who acts in contravention of this section shall be liable for every offence to forfeit a sum not exceeding £50 to the registered proprietor of the design, who may recover such sum as a simple contract debt by action in any court of competent jurisdiction.

Notwithstanding the remedy given by this Act for the recovery of such penalty as aforesaid, the registered proprietor of any design may (if he elects so to do) bring an action for the recovery of any damages arising from the application of any such design, or of any fraudulent or obvious imitation thereof for the purpose of sale, to any article of manufacture or substance, or from the publication, sale, or exposure for sale by any person of any article or substance to which such design or any fraudulent or obvious imitation thereof shall have been so applied, such person knowing that the proprietor had not given his consent to such application.

In and for the purposes of the Patent Act:—"Design" means any design applicable to any article of manufacture, or to any substance artificial or natural, or partly artificial and partly natural, whether the design is applicable for the pattern, or for the shape or configuration, or for the ornament thereof, or for any two or more of such purposes, and by whatever means it is applicable, whether by printing, painting, embroidering, weaving, sewing, modelling, casting, embossing, engraving, staining, or any other means whatever, manual mechanical, or chemical, separate or combined, not being a design for a sculpture, or other thing within the protection of the Sculpture Copyright Act of the year 1814.

"Copyright" means the exclusive right to apply a design to any article of manufacture or to any such substance as aforesaid in the class or classes in which the design is registered.

The author of any new and original design shall be considered the proprietor thereof, unless he executed the work on behalf of another person for a good or valuable consideration, in which case such person shall be considered the proprietor, and every person acquiring for a good or valuable consideration a new and original design, or the right to apply the same to any such article or substance as aforesaid, either exclusively of any other person or otherwise, and also every person on whom the property in such design or such right to the application thereof shall devolve, shall be considered the proprietor of the design in the respect in which the same may have been so acquired, and to that extent, but not otherwise.

Tangents of Trade Mark Law.

By C. Stuart Murray.

(*Continued from page* 70.)

A MANUFACTURER had a certain mark upon his goods, and after some time he removed to another part of the country, taking his business along with him. A new comer upon the abandoned works set up the same letters, when an injunction was moved for and obtained, but was afterwards dissolved, there being a substantial question as to whether or not the new owner of the premises had not the right to the trade mark, as belonging to the works to which it was attached. In one of these cases no costs were given, on the ground that the plaintiff continued the suit after the defendant had offered to him all that he was entitled to by law. It has been held that the initials of a firm that are used as a trade mark cannot be sold for a trade mark by reason that they belong to the persons who formed the late firm, and had no local foundation. An outgoing partner not desiring his name to be before the public in connection with the late co-partnery, had an express provision in the dissolution to that effect. He obtained his prohibition with costs.

I now come to a case in which a well-known firm and another manufacturer took a third one into court for improperly using a trade mark. It appears that the original member or founder of the firm carried on business at several places, marking his goods with his name. In his will he bequeathed all these places to several members of his family, one to each. They carried on the trade, using the trade marks in the same manner in which their predecessor had used them. The defendant, not deeming that the new owners had any right to the trade marks, and being in the same trade, took the marks of the deceased manufacturer. An action was brought, and it was held that the defendant had no right whatever to the trade marks, and an injunction must issue with costs, and the delivering up of the falsely marked articles in order to have their marks erased; also for a sales account of the goods that had been sold with the said marks, and the profits that had been derived therefrom.

The next case of this kind that has come in my way is that of the celebrated Jurgensen, of Copenhagen, *v.* Alexander. The plaintiff stamped his watches with his name, "Jules Jurgensen, Copenhagen," and constituted the stamp as a trade mark. The defendant sold watches with a similar mark in England, and an injunction was moved for in the London Court of Chancery. After the hearing of the case the injunction was granted, the marked watches to be given up to have the marks erased, and the defendant to pay the costs of the suit. Those costs, on account of the nature of the case, being partly foreign and partly English in the production of evidence, were exceptionally heavy. It was tried in 1862.

Again; with respect to letters as trade marks. I am speaking now of the old law, and not of the Act of 1875. A manufacturer put on his goods the letters H. H., and the figure 6 to denote size. An injunction was applied for and granted, because the figure 6 was so placed as to deceive as to who made the goods. It has been laid down as a clear rule that a Court of Equity will not extend its protection to persons whose case is not founded in truth. I may or may not have mentioned this before, but it will be useful even if repeated. A principle of law that has been often, and is every day, misunderstood, is with respect to the title in the *abstract* of any letters or symbols upon which to found a trade mark. It will be of some service to the younger generation of our readers if I here state what meaning the law gives to this word "abstract." Let us suppose that a man is a watchmaker, and that he selects for a trade mark *Fides servanda est*—"Faith must be kept." Suppose that he adds some other trade to his watchmaking, that of a silversmith, for instance. The court will not allow him to "abstract," *to draw away from*, his watchmaking trade mark, and put it upon his silver wares. The dicta of the judges have laid it down that the name or symbol can only be protected in connection with the particular class of goods to which it has been originally assigned. It is exclusive so far as watchmaking is concerned, and in that application becomes a property, but in no other. What we may call defendants sometimes sail very closely to the wind, and in doing so occasionally get wrecked. Such doing so is held to be an imposition on the public, apart from other injury elsewhere. If any imitation is used it must be done in such a way as not to be mistaken for the genuine mark. No man is to sell his own manufactures under the pretence that they are the goods of another person, as such selling would be an endeavour to make that other person's custom to flow towards himself.

No general rule upon a hard and fast line can be laid down, as every case must be governed by its own circumstances. The general principle is what has been previously hinted at, namely, that one person is not to be allowed to show forth what he has made as the production of another person who may have a reputation for that particular production. In fact that other person must have the reputation stated, otherwise no one would deem it worth while to imitate him. The court exercises its jurisdiction against the infringer of a trade mark on behalf of the public, who, as the buyers, have been led into a mistake by the infringer's announcements. Such conduct is held to be a fraud upon the public, because persons buying look to the trade mark to tell them by whom the goods were manufactured, and where they may be obtained.

Another kind of case has been decided by the courts. A manufacturing firm made and patented a certain machine, and passed through the usual campaign in doing battle against invaders. Time went on until a stranger appeared upon the scene with a *fac simile* of the same article with, in addition to his own name, that of the original makers. They immediately ran off at one-wheel bicycle speed to the Court of Chancery for an injunction. The arguments lasted until the Master of the Rolls concluded that he had heard quite enough of them, and then, to the consternation of the applicants, he made inquiries about the patent. The answer was fatal. The patent had run out! The judge upon hearing that refused the injunction in anything but flattering language. He said that the name had become merely a description of the principle upon which the machine was constructed, and the court would not assist an attempt at continuing a monopoly in an article after the expiration of the patent by a claim to the exclusive use, by way of trade mark, of the name by which the peculiar principle of construction had come to be generally known. Now a very important question arises here. That is, had the plaintiff a solicitor who knew even the rudiments of trade mark law at the time? If he had, how could that lawyer conscientiously have advised him that he "had a good case?" Thousands of men who are not lawyers know very well that when a patent has run out, there is an end to all property in it, exactly as there is an end to a leasehold when the lease has run out. But, on the other hand, the plaintiff may have had a lawyer who did advise him soundly, and told him the true state of the case. He, in the unexplainable obstinacy that takes so many litigants into the law courts, may have sworn by his household gods that "he would drag the fellow into

Chancery, although there was not a leg to stand upon." These things are very amusing to read about, but when the bill of costs comes in, how then? That is very likely to put quite another aspect upon the matter. It reminds the losers forcibly of the oft-quoted couplet:—

> "Men laugh and riot till the feast is o'er,
> Then comes the reck'ning, when they laugh no more."

The original is really to be found in Gay's comedy of *The What d' ye Call 't*, and runs thus:—

> "So comes a reckoning when the banquet's o'er,
> The dreadful reckoning, and men smile no more."

That seems much more applicable to a "banquet" in the law courts than any other couplet that I am aware of.

From what has been said above it will be deduced that a name which has come to be merely descriptive of the article to which it is attached, indicating what that article is, unless it is bound up with some maker or manufacturing establishment, cannot be protected as a trade mark. Furthermore, where the mark, though not descriptive, yet fails to distinguish the person who may be using it from a number of other people who are using it, or who may have the legal right to use it, it cannot be protected as a trade mark. To carry the matter into a field that has existed for years, almost since the Great Exhibition of 1851, namely, the medal "pastures," it may not be too late to make it known that "prize medal," "gold medal," etc., cannot be set up as a trade mark. A person may give any recommendatory names that they choose to what they have to sell, may advertise the goods coupled with their own names; but other people may use the same degrees of comparison in the same way. For instance, the words "first-class," "superior," "fattening," "nourishing," etc., etc., may be equally used by a thousand people at the same time, in unison with the name of each, as no trade mark whatever can be set up by any of them. A certain trader, however, thought otherwise, and he put the word "nourishing" with respect to an agreeable thirst-allayer. The article "took," and to such an extent that an enterprising competitor soon appeared before the thirsty world with the same kind of fluid, and with "nourishing" as well. Here was a distinct challenge, which was at once accepted, and the first "nourishing" legally took the second "nourishing" by the scruff of the neck and dragged him before the Court of Chancery, and there delivered him over for punishment and example. The sequel, however, was otherwise. After hearing about a side and a half of the case, nourishing number one was told to his dismay that he had no more right to the name than anybody else. That "nourishing" was a word in the English language, that every good and true tavern-keeper could use the word to all his delicious "tipples," if he pleased, and that the plaintiff must be non-suited, and pay the costs of the defendant. I recollect the case well, because I won an evening's feast of very excellent cigars and "revivers" from a conveyancer—who knew nothing of trade marks, by the way—upon the issue of the case.

Words from the Greek and from the Latin have been protected, and occasionally words from foreign languages coupled with the name. A man may call a superior kind of watch the "Alpha-Omega" timekeeper; it would very likely turn out before the law that the name would be protected. Perhaps, to make the anchorage into good holding-ground, it would be better to have them printed in their Greek form, thus—Αλφα-Ομεγα, in order to enable them to hold water. Such an arrangement would be widely different in the eye of the law to any English words used in every-day conversation among people. As has been shown, such an application of words has not been held to be good; but every-day words from foreign languages have been held to be outside the protecting lines.

As affording some illustrations upon these points, I will give the case of Gout v. Aleplogln—each reader may pronounce the seven-consonant name according to his own lights, for I cannot help him.

The plaintiff, Gout, was a watch manufacturer, dealing chiefly in the market of Constantinople. He marked all his watches in Turkish characters with his own name, Ralph Gout, and the word "Pessendede" ("warranted"). In addition to these he had his initials with a crescent, and also with a sprig and a crescent. The defendant had watches made in the same way, so far as pattern, size, and appearance could correspond. Some of the more insignificant details in the marks were left out, and that was all the change so far as "look" was concerned, but the leading characteristics were precisely the same. There was the name, Ralph Gout, and the word "Pessendede" (warranted) in Turkish characters, the style of the original engraving being exactly copied. Those watches were sent to Constantinople and sold, to the serious injury of the business and profits of Mr. Gout. Upon the conclusion of the arguments, Vice-Chancellor Shadwell held that the conduct of the defendant amounted to a clear case of fraud, and that the plaintiff had by long previous usage acquired the right to the word "Pessendede" in Turkish characters, in connection with the sprig, to designate his watches. But what really had to be decided was whether the word "warranted" could by itself be protected. Watches sold in Turkey were in very much the same position as watches sold in England, where the word "warranted" simply would be clearly untenable. But there was not only the word but the manner of engraving it, and the sprig told in favour of the plaintiff. They were so closely copied along with the name of the plaintiff as to constitute a clear case of attempted fraud, which fraud would be quite sufficient to obtain an injunction. The use of the name Ralph Gout would alone be deemed sufficient, but, taken with the other parts of the case, there could be no doubt but that the defendant meant to put off his watches at Constantinople as the watches of the plaintiff.

In some cases initials with or without additions have been accepted as entitled to trade-mark protection; but such protection has been subject to certain qualifications, the principal of these being where the articles have never been known by any other name. The Lord Chancellor upon one occasion said that two letters may constitute a trade mark; indeed, he added, there could be no dispute about it. It may be advisable here to caution our readers that since the Act of 1875 all initials intended to be used as trade marks must be combined with something else that shall constitute either by themselves or itself a new and distinctive feature. As has been previously mentioned, if such initials have been used before the Act, they will be protected, even if standing alone; the only difficulty might be as against persons having the same initials, and using them legitimately, that is, without any attempt at fraud. Nor can single letters be protected under the law of 1875 now, although long used as trade marks before that date. Then, again, with respect to numerals, they can only at present be registered in their combination with some essential particular, so as to constitute a new mark. But there are cases where numerals have been placed upon goods for the purpose of misleading, by the imitation of numerals that had been long used in the same way by another manufacturer; there are cases where the imitation has been restrained. Actual fraud by such imitation has been shown, and the court has interfered and put a stop to it. To show the niceties into which trade mark law is divided, I will slightly vary a position that I laid down a short time ago. It has been laid down that a trade mark can only apply to a particular commodity that is vendible in the market. Let a silversmith invent a trade mark for his silver goods, and register it; he will be protected. Strange to say, a clock and watchmaker may use that mark—with his own name, mind you—for clocks and watches, but not for silver goods. Watch-cases are not held to come under the denomination of "silver goods." The late Master of the Rolls. I think, laid it down in express words, thus:—"Property in a trade mark is the right to the exclusive use of some mark, name, or symbol in connection with a vendible commodity; consequently, the use of the same mark in combination with *a different article* is not an infringement of such a right of property." Again:—"An ironfounder who uses a particular mark for his manufacture in iron, could not restrain the use of the same mark when impressed upon cotton or woollen goods; for the property in a trade mark consists in the exclusive right to the use of that mark as applied to some particular manufacture." Indication of the quality of an article will not of itself constitute a trade mark, but the name of a place of business along with it will.

What has been laid down in the form of legal explanation here has been deduced from the dicta or ruling of the judges in actions that have been tried in court from time to time. I had thought at first not to have dealt with them at all in this paper, but to have gone into the recent state of the law. Upon reconsideration, however, I concluded, and I hope rightly concluded, that cases which are looked upon as guiding lights both in the courts and out of them—some of which I have heard tried myself—would be the most useful under the circumstances. The Trade Marks Act of 1883 can more clearly have its forms and provisions set forth in a paper entirely to itself, and on a future occasion I may have the opportunity of dealing with it.

The Watch Wouldn't Go.

WHY IT WOULD NOT GO, AND WHAT IT WOULD COST TO FIX IT.

"HERE is your watch," said the jeweller, as he tore off a small white tag from the ring of a well-worn silver watch and handed the time-piece to a reporter, one day last week. "If it breaks inside of a year you can bring it back and I will fix it for nothing. I don't think it will trouble you, though, for it was very thoroughly repaired by one of our best workmen." "I hope not," replied the reporter, as he paid the jeweller $3 and left the store with the watch ticking loudly in his pocket. For nearly a week the watch was a model of regularity, recording the time even to the minute with the great, yellow-faced clock in the City Hall tower. One morning, however, when it was drawn from under his pillow, the reporter discovered to his dismay that the hands were pointing to the hour of 2 o'clock. A few feeble ticks responded to a jar. The stubby second hand moved slowly about one-quarter around its short circuit and then stopped as before.

After breakfast the unfortunate owner stepped into the nearest watch-maker's, a seven-by-nine shop in upper Broadway, and asked the proprietor what was the matter with the watch. The jeweller took the time-piece, prized open the inside cover with a small can-opener and peered into the works. After a cursory examination he handed it back to the owner. "It needs cleaning," he said.

"Cleaning," ejaculated the reporter, in astonishment, "why, I paid $3 only last week for having it thoroughly cleaned."

"I can't help that," replied the jeweller. You were very foolish to take such a watch to a second-class workman. The reason it don't run is because it's dirty. The pinions are covered with dust and the oil is all gum. Leave it here and I will fix it for you in good shape. Call again on Saturday and it will be ready. It will only cost you $2.50, and you will then have a watch you can be proud of."

Thoroughly disgusted with the watch and the man who had warranted it, the reporter declined the offer, pocketed his time-piece and left the shop. A few doors below, on the same thoroughfare, a brazen watch with a pair of black hands pointing fixedly to 12:20 swings from a rusty iron bar. The reporter passed under this sign and entered another jewellery store. A fleshy person, who was seated at a work bench facing the window, reached for the watch and proceeded to open it as one would open an oyster. "Yes," said he after sundry punches in the vital regions of the works with a small steel instrument such as dentists use, "the jewel is broken. Any man with half an eye can see that. I wonder the watch ran at all. Have you dropped it anywhere? No? Well, that's strange. I can't be mistaken. The jewel is certainly broken. Leave it with me, and I will put in a new one. It will cost you only $5, and call around some day next week. What name, please?" The name was not given, and the watch was returned.

WORSE AND NO BETTER.

In the block below a tall street clock indicates the presence of another jewellery establishment, while a brilliant assortment of diamonds and watches in the front windows attested its claim as a fashionable emporium. The reporter went in there. A languid young man, with a drooping moustache the colour of barley straw, took the watch, and after working his way into the movement placed a small lorgnette to his eye and glanced over the assortment of wheels and pinions and springs which were so numerously and diversely disordered. He remarked: "Your watch is very badly out of repair. The escapement does not seem to be doing its work. The hair-spring is too long; it has too much play. I will cut it off and shorten it." Here he reached for a small instrument to sever the spring, but the reporter interposed. "No," he exclaimed, as he rescued the time-piece; "don't cut the spring. I guess that is not what ails the thing for I paid $3 for having it repaired and cleaned only last week, and it ran very nicely until this morning, when it stopped."

"Oh, yes," interrupted the young man, "I see; you dropped it and the spring was spread out by the jar. I will undertake to repair it thoroughly for $4, so that you can rely on it. I will give you a guarantee, and if it breaks—"

Having had sufficient experience in Broadway, the owner of the watch now visited the Bowery. A large gilt sign over a wide doorway and several suspended clocks and watches, also in gilt, betokened a "jewellery palace," and into it the reporter walked.

"What is the matter with this watch?" he asked.

The preprietor, an elderly man, took the time-piece, shook it, listened, opened it, gazed into it and shook his head. "Moses!" called the old gentleman to a second young man, younger than Hiram, who came from behind the rear partition. "Moses," said he, "you dell de shentleman vat ish de madder mit his vatch."

Moses looked at the poor, miserable time-piece with even more solemnity than his brother, and, after sundry lugubrious shakes of his head responded:

"De cap chewel ish owet of blace. It vash growded back of de esgapement. If you dry to make it run mitowet gitting it rebaired, you will ruin your vatch. I never saw a vatch as bad as dat. It will gost you $5."

"I can't leave it to-day," responded the reporter.

"I will gif you a fine job for $4, for $3, for $2, for a dollar and a halluf; and I vouldn't do it von cent sheaper for my grantfadder."

But in spite of the liberality of the offer the reporter pocketed his watch and pursued his search for information. Many other stores were visited, and many more jewellers were interviewed. There were seventeen in all. Three attributed the stoppage to a broken main-spring, five said it was caused by dirt, three thought that broken jewels made the trouble, two diagnosed it as a case of bent pinions, and the remainder were divided in their opinions, varying from a disordered escapement to a broken tooth in a cog-wheel. Finally, tired of watches and watchmakers, the reporter carried it to the jeweller who had originally repaired it. "There," said he, as he laid the time-piece on the velvet counter-mat, "take this miserable, ailing watch. You may keep it or give it away, just as you please. It hasn't a whole wheel in it. The main-spring is broken, the escapement is out of sorts, it wasn't half cleaned, and it is entirely ruined. It will cost me a small fortune to have it repaired. I don't want it any more. It makes me tired to see it around. I'll buy a new dollar-and-a-half watch that I can take some comfort in."

The jeweller took the time-piece and retired into the workshop. In a few minutes he returned with a broad smile upon his face.

"Here it is, in perfect order. There is nothing the matter with it. You forgot to wind it up last night."—*Detroit Free Press.*

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The New Patent Watch.

By C. Stuart Murray.

IT is more than probable that many of the readers of this journal, in the course of their wanderings through the many courts and places of the recent great Fisheries Exhibition may have noticed among the numerous accessories of those "who go down into the sea in ships," a stand of watches that drew the attention of the public by a peculiar form of invitation. That invitation was neither more nor less than a small tray full of—what does the reader think? "Cudgel thy brains no more about it, for your"—why, full of broken watch-keys! But what, in the name of springing and timing, and long arcs, and short arcs, and setting up, and all the rest of it, could a "bushel" of broken keys have to do with the interest of the passer-by in a well-appointed exhibition watch-stand? Sir John Suckling, the author of the famous toast-song in the *School for Scandal*—which song Sheridan "annexed" to the comedy as his own without the slightest twinge of conscience — Sir John says in the prologue to *Aglaura* :—

> "But as when an authentic watch is shown,
> Each man winds up and rectifies his own."

That is just it; the casualties among the keys on the tray have had to do with the winding of the watches. The fact is that the stand in question was to show, as well as to test, a winding mechanism from an entirely new departure. This winding is done with the ordinary key, but the principle embodied in the patent is entirely different from anything of the kind that we have, hitherto, either seen or heard of. In the method under consideration the stop and clickwork are combined, the adaptation is for the going-barrel, and that barrel no longer carries the stopwork, but simply a small steel arm. The mechanism is attached to one of the plates, and may be said to consist of a disc, working within a circle, which carries a spring and a click with two tails, the click moving upon its centre and being in shape very much like a pair of pallets. The ratchet is a circular one, having the teeth on the interior rim of the ring, and into the spaces between these teeth the two talons of the double-tailed click alternately fall, thereby giving the double action to the stopwork and clickwork. The barrel-arbor goes through both the annular ratchet and the disc and watch-plate, and in the process of winding sets the double action in motion. It will thus be seen that the plate upon which the ratchetwork is fixed is the part that takes the strain off the barrel, and not the barrel itself. The work is very strong, but, in the highly improbable event of the weakest part — the click-spring—breaking, it will than be utterly impossible to wind the watch at all. The reason is obvious. When that accident occurs the whole of the mechanism is brought to a dead-lock, which cannot be removed until the cause of it has been remedied. During a state of rest one or other of the talons of the click are in one of the indents of the circular ratchet, and it is only the action of the spring produced by the winding of the watch that takes the talon out of the locking-space. We now come to the key-breaking part of the arrangement. The mechanism just mentioned is so strong, both in construction and design, that when the winding is finished, with half a turn of the mainspring to spare, the locking action, guided by a flat, spiral groove upon one face of the disc, throws a talon into the recess between any two teeth and keeps it there. Nothing will release it except the running-down of the watch, when it can be re-wound. It follows, therefore, as a mechanical consequence, that to attempt to force it when locked by means of the key, is only to try whether this stopwork or the key is the stronger. In those that we tried, and in those that we saw tried, the key stood a very poor chance indeed. It was hard work for the winding-fingers whilst the pressure lasted, but of the key-pipe breaking off there was not the slightest failure. Another thing. In going-barrel watches that have the extra work to give fusee-winding, and with people, accustomed to fusee watches, who have changed to a going-barrel, such people are apt to forget the change at times, and wind the wrong way for that particular instrument. Upon the occasion of such a lapse of memory, no harm would be done to any wheel or pinion of the train. The negligent winder would sharply be reminded of his error by the simple but fully effective breaking of the key; a process on the part of the new stopwork which would not require many more of the same convincing kind of arguments. Whichever way the key is turned, to the right or to the left, the right or left talon of the clickwork responds to the action and takes into the ratchet on the interior rim of the toothed locking-ring. This ring is as large, or larger, than the barrel itself, and is fixed to the watch plate by screws. A combination of simplicity, strength, and hard-wearing endurance is claimed for it, with the hitherto unattained advantage of protecting the train by the prevention of force acting upon the barrel-teeth during winding; furthermore, that this mechanism does not add a single extra piece to the construction of a watch in any way.

Messrs. Cooper and Sons, watch importers, of 10, Amwell Street, Clerkenwell, have secured the right to be the sole manufacturers and importers of all foreign watches fitted with Wright's Patent Winding Mechanism.

The new patent watch has gone through much "rough-and-ready" experimental usage throughout the months that the Fisheries Exhibition has been open. The jurors, after amusing themselves with key-breaking until their fingers ached to the uttermost limit of finger-sufferance, laid their heads together in consultation and gave the highest award —a silver medal — for this small, but really ingenious winding-work. It certainly marks an important onward step in a long stride, in the direction of suspending for a while the brain-racking for the improvement of key-winding watches. It is intended to give drawings of the mechanism in a future number, when we may have occasion to make a few supplementary observations to what we have here said.

A Workmen's Check Clock.

Mr. N. C. Firth, of Chester, has invented and just patented a most ingenious contrivance for accurately checking men's time. The invention consists of an ordinary clock with a brass revolving disc attached, in which are a number of slots representing five minutes, or whatever time may be required. Into these slots are put the patent checkers (pieces of copper about the size of a halfpenny), and as the disc revolves, at the same rate as the clock fingers, one drops through a nick at the bottom of the drum in which it works, and falls down into the tube for receiving the workmen's brass checks, which are dropped down an aperture in front of the clock. Thus, for example, a place of business is opened at six o'clock, and the men commence to drop in their checks. At five minutes past six down drops a checker, which shows that the workmen whose checks are under it were in the works before that time. At ten minutes past down drops a second, denoting that those between the checkers entered between five and ten minutes past, and so on. The clock being locked up, no one can tamper with it, and no dispute can arise as to the time at which anyone entered the works. This is not the only advantage gained. In small works it will do away with the timekeeper entirely, whilst in large establishments it will reduce his work to the minimum. We understand that Mr. Firth has already supplied two firms in the city with his invention, which has given general satisfaction, and that he has orders for several more. The one we inspected is intended for Mr. T. Browne, builder, Tower Wharf, and will check up to 140 men.—*Chester Chronicle*, October 27th, 1883.

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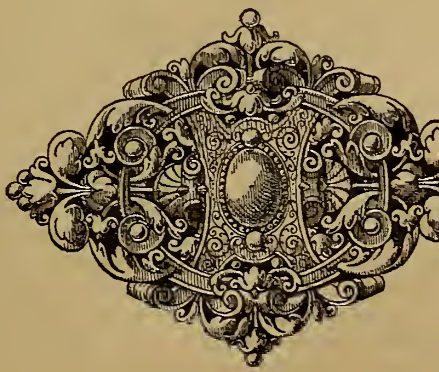
Curious Case of Alleged Infringement of Patent.—James Tayton, watch manufacturer, Norfolk-street, Coventry, *v.* Thomas Wheeler, jeweller, &c., 160, Lancaster-road, Preston.—Claim, 19*l.* 3s. for six watches supplied.—Mr. Minster for plaintiff; Mr. Masser (Messrs. Hughes and Masser) for defendant, who admitted the claim, but entered a counter-claim for £180 for an alleged infringement of patent, which amount, however, was reduced to £50, to bring the case within the jurisdiction of the Court. The case rested mainly on documentary evidence, from which it appeared that the plaintiff bought a number of watch movements from a Mrs. Adams, whose husband had formerly been a watch manufacturer. A man who had formerly been in the employ of Mr. Adams, saw the plaintiff on the subject, and told him he thought that Mr. Wheeler would purchase the watches if certain alterations were made to them to make them like the kind Mr. Wheeler had formerly purchased from Mr. Adams. Two of the watches were made up accordingly and sent to Mr. Wheeler, with the request that he would purchase the six, and he wrote on the subject, and eventually ordered the other four watches, which were sent. A claim being made upon him he declined to pay, on the ground that Mr. Tayton had infringed his patent, which consisted in the cutting of four circles intersecting each other on the plate of the watch above the stop work, in order to show a portion of the mechanism, and upon this action being brought entered a counter-claim for the amount stated.—Mr. Tayton, in reply to this, pleaded that he was licensed by Mr. Wheeler to do this, and relied upon a letter sent to him by Mr. Wheeler on receiving the two watches, ordering the other four, and mentioning the cutting of the hole above the stop work.—It was stated, however, on Mr. Wheeler's behalf, that at the time he wrote the letter he had not examined the watches, and that he only meant an ordinary hole instead of the patent circles which Mr. Tayton executed, and also that even if this letter should be construed into a license, it did not affect the two watches which had already been sent infringing his patent.—Mr. Tayton further contended that Mr. Wheeler was not entitled to this patent, as it was not original, and called evidence to show that watches had been made in Coventry with these circles cut upon the plate before Mr. Wheeler registered the design.—In the end his Honour gave judgment for the plaintiff (Mr. Tayton) for the amount claimed for the watches, and barred the counter-claim, remarking that it was evident Mr. Tayton had no intention to defraud, as he sent the watches to the very person to whom the patent belonged, and he thought that the counter-claim was an after-thought with a view of resisting the payment for the watches received. He also believed that the design was not original, and altogether was in favour of Mr. Tayton.—In reply to Mr. Minster, his Honour said costs would follow on the scale of the counter-claim.

"The Manufacture of Repeating Watches."—Owing to pressure of business we have been unable to complete a sufficient quantity of the translation of Mr. John Huguenins' valuable article in time for this month's issue.

The Clockmakers' Company have added another complicated condition to those already existing with regard to the prizes which are professedly offered to encourage the highest excellence in the production of the marine chronometer. As we anticipated, no prizes will be given this year. The new rule is as follows, we leave it for our readers to study:—"8a. In the event of a chronometer maker who has obtained a first-class prize being successful in any subsequent year in obtaining the first place at the annual trials, the Court of Assistants may, if they think fit, award him the original sum of £10 10s.; and in such case they may also award the two competitors immediately below, the first and second class prizes respectively, provided the instruments are certified by the Astronomer Royal as worthy of such awards."

"The Worthies of Horology," by C. Stuart Murray will be continued in our next issue.

At the Aston Police-court, on the 21st ult., William Henry Read, watchmaker, was charged on remand with stealing thirteen watches of the value of 28*l.*, the property of the English Watch Company, Villa-street, Aston. Prisoner was in the employ of the company as a watch finisher, and he pawned a number of the watches which had been entrusted to him. Prisoner pleaded guilty, and was sentenced to three months' imprisonment.



Trade Notes.

Business in high-class watches is steadily improving; we confidently predict that a more healthy tone will pervade the genuine English watch trade in the coming year. Our own experience has tallied with the general state of the trade for many years past, and our readers may rely that we have good and sufficient reasons for writing hopefully now.

The Gold and Silver Trades.—Mr. E. J. Watherston writes:—"From the Census Returns lately issued, it is found that the number of persons engaged in the trades of the precious metals and jewellery in England and Wales is 24,715, of whom 3,753 are females. This does not include "beaters" of the precious metals, of whom there are 661, all males. In France the proportion of females to males is far greater than in England. In the single Parisian industry, 'articles de Paris,' there were, at the last census, 21,261 women to 13,657 men."

A discussion concerning the rates of wages in the chief towns of North and South Germany has brought out that the average weekly wages (the working day being twelve hours all through the week) paid in Berlin to gold and silver artificers, according to the class of work upon which they are employed, vary from twelve to thirty marks (one mark = one shilling); watchmakers, eighteen marks. A Munich industrial journal, commenting on these rates, observes that wages in South Germany are about equal to the Berlin rates; but the cost of living and lodging is much less.

Messrs. Crowther Brothers & Co., of Kidderminster, in order to prove the malleability and ductility of their iron, have constructed a watch entirely of iron, which keeps excellent time. Claudius Saunier, in reporting this fact in the Revue Chronométrique, adds: "There is nothing new under the sun. We have a watch upon which is engraved the date of 1504, and in which all the wheels and pinions are made of iron."

A beautiful and permanent dark or light green coating, resembling enamel, can be applied to all kinds of zinc articles, especially those made of sheet zinc, says Puscher, in the following manner:—Fifty parts of hyposulphite of soda are dissolved in 500 of boiling water, and the solution poured at once in a fine stream into twenty-five parts of strong sulphuric acid. The milk of sulphur that separates will soon ball together in lumps and settle. The hot liquid containing sulphate of soda and sulphurous acid is decanted and the cleansed zinc put in it. In a short time it will acquire a very brilliant light green coating of sulphide, and only needs to be washed and dried. By exposing it repeatedly and for a longer time to this hot bath, the coating grows thicker and the colour darker and more brilliant. The temperature must not fall below 145° Fahr.; when it does, it should be heated up to 190° Fahr., to obtain a fine and brilliant deposit. By dipping these articles in dilute hydrochloric acid, one of acid to three of water, sulphuretted hydrogen is evolved, and this enamel-like coating loses its lustre and gets lighter in colour. Aqueous solutions of anniline colours have little effect upon this dull surface, and none on the gray, brilliant coating. The effect of marbling can be obtained by moistening the gray zinc and applying hydrochloric acid in spots with a sponge, then rinsing it off, and, while still wet flowing over it, an acidified solution of sulphate of copper, which produces the appearance of black marble. As the zinc has generally a dull surface, it must receive a coat of copal varnish. If fifteen grammes of chrome alum and fifteen more of hyposulphite of soda be added to the above solution, the article will have a brownish colour. The above can all be applied to articles made of cast zinc.

M. Brequet, whose name is, and will be, inseparable from the horological art, died suddenly during the night of October 26th. The *Revue Chronométrique* will shortly publish his memoir, the appearance of which we are awaiting with interest.

Sir William Siemens has also terminated his illustrious scientific career, at the comparatively early age of sixty. His death was occasioned through a fall in the streets, which caused a rupture of the heart, and he expired on the 19th ult., after a few days' illness. It is not twelve months, since the successful candidates at the Technological examinations conducted by the City and Guilds Institute, received their prizes from his hands. On that occasion some of the remarks in his address coincided so remarkably with a letter of our own, which had just appeared in this Journal, that we ventured to send him a copy, the receipt of which was courteously acknowledged in due course.

The sixtieth anniversary and distribution of prizes in connection with the Birkbeck Literary and Scientific Institution, is to be held at Southampton Buildings, Chancery Lane, on the 23rd inst. at eight p.m. The Right Honourable Lord Carlingford, Lord President of the Council is announced to preside.

The half-yearly meeting of the watch and clockmakers' Pension Society was held at the Horological Institute on Monday evening, October 29th, when Mrs. Ann Stevens, aged eighty-three, was elected for a pension of £13 13s., this being her third application. She received 340 votes, Mrs. Swainson closely following her with 332, three other candidates having 101, thirty-two, and twenty-one respectively. We shall be glad in our capacity of treasurer to receive donations for the society.

A general National Industrial Exhibition is to be held at Budapesth, Hungary, in 1885, of motors, working machines, and tools for artisans; as well as for agricultural machines of the latest and most improved constructions, and also for important patented inventions and improvements. Our readers will be interested in Secondary Class II, which includes machines and tools for goldsmiths, silversmiths, goldbeaters, jewellers, watchmakers, and instrument manufacturers.

Bronzes.

By C. D. E. Fortnum, F.S.A.

BRONZE SCULPTURE, &c., IN ENGLAND.

In an earlier chapter we referred to the technical excellence of bronze implements, the productions of our prehistoric forefathers. The same characteristics of thorough workmanship, high finish, and accuracy, have since prevailed in all the metal work of British handicraft or manufacture. In no country have these qualities been surpassed, and in few have they attained an equal perfection. But it is of a mechanical rather than an artistic excellence that we may boast; and although our castings may be perfect, free from flaw or grit, we may not claim a forward place in the arena of the plastic arts. They are hardly native to us, and whilst some among our painters and engravers have been unsurpassed in "genre" and in the representation of natural scenery, sculpture has not attracted so many English votaries, nor inspired them with the highest qualities of invention or of plastic power. Neither do we believe that works of sculpture are so attractive, or so comprehended by us, as a people; they do not appeal to us, in smaller or in larger form, as to more southern and continental nations; colour is more to us than form, and painted rather than modelled surface. Probably from its sombre tone bronze has not been a favourite material in England, and though we are rich in royal effigies of that metal, they have been with few exceptions gilded. Among sculptors in marble we may justly feel proud of a few names well forward in the ranks of excellence.

Notwithstanding the Roman occupation and its civilising effect, during some four and a quarter centuries it did not impart to us the art-creative spirit and desire which that people had adopted from other and more gifted nations. But we had among us good bronzists and enamellers, and Celtic workers in gold, worthy to be compared with even Etruscan artists. Some among the rude Saxon hordes, who swept from before them all that remained of Roman institutions, were metal workers of no mean ability. Ireland also had a strong influence upon our arts and civilisation in post-Roman times. So that before the Roman Invasion, England had many able workers in the precious metals, whose craft had been imported or improved through Teutonic and Byzantine influence.

The curious and characteristic sculptures of the tenth and eleventh centuries at Chichester Cathedral bear some impress of the antique manner. The font at Winchester, and the reliefs at Shobden, as also the Prior's Gate at Ely, are native works in stone. Others succeed; and recumbent figures of knights and churchmen were stiffly fashioned in stone and Perbeck marble. Except in rarer instances, monumental effigies on tablets of metal were engraved or incised rather than fashioned in relief, as was the case in Germany, the country where these brasses appear to have originated. In England they were extensively adopted by all the middle and higher classes of society, and their production would seem to have developed to a greater extent than in Germany or even in the Low Countries. The brass or latten plate, first imported from Germany and Flanders, and known as "Cullen (Cologne) plate," was subsequently manufactured in England. In no country are these memorials so numerous as with us; and it is impossible to rate their archæological value too highly, as memorials of the manners, dress, and architecture of former times; or their importance as genealogical and historical records, for sometimes "their witness lives in brass," and in that alone.

The use of brasses extended from the twelth century, and has never since entirely ceased, a revival having again taken place within the last few years.

The addition of enamelling to monumental effigies and to brasses was not unfrequent, but always upon copper plates. In Rochester Cathedral was the tomb of Bishop Walter de Merton (1277), an enamelled work destroyed by the Puritans. The earliest brass recorded in England was that of Simon de Beauchamp, of 1208; the earliest still preserved is that of Sir John d'Aubernon (1277), at Stoke d'Aubernon, in Surrey, and one other of that century, 1289, Sir Roger de Trumpington's, at Trumpington, near Cambridge. Perhaps the latest previous to the recent revivals is in St. Mary Cray Church, Kent, of 1776. Occasionally brasses were used a second time without fresh casting; the plate was generally turned, and the effigy of the person to be recorded incised on the reversed surface, the engraving being adapted to the form. A few are in England, having on the reverse portions of earlier Flemish workmanship, they are known as "palimpsest brasses." Sometimes the original face was used, and the engraving altered and adapted for the new claimant.

The composition of a brass of 1504 was found on analysis to contain, copper, 64·0; zinc, 29·5; lead, 3·5; tin, 3·0.

Early English brasses are formed of separate pieces shaped to the outline of the figure, and inlaid to an even surface on a slab of stone. Foreign brasses, on the other hand, show less economy of metal, the large quadrangular plate formed, of pieces neatly joined together, being covered with richly designed architectural incised ornament surrounding the effigy. The engraving on the larger number of English brasses was certainly the able work of native hands; but it is a curious fact that, with the trifling exception of a few initial letters or a mark, no names of individual artists have been transmitted by their own chisel. It has been suggested that. as the quantity was so great, they may have been produced by members of various guilds; if so, probably of silversmiths, or of workmen who made the angle-plates and clasps for choir books, and other things for ecclesiastical use.

Although the names of these English artists are not recorded, it is reasonable to suppose that the founders of some of the royal effigies were also makers of brasses, and it is probable that certain bell-founders and latteners of the fifteenth, sixteenth and seventeenth centuries, whose names, we know, were also producers of these fine incised memorial slabs. Among them are Roger of Beccles, in 1411; Richard Brazier, a bell-founder, of Norwich, who died in 1513; Silvanus Crue, 1658; and William Vaughan, 1671, who executed the finely wrought busts of Lady Mary Mostyn and Lady Sarah Wynne, in Gwydir Chapel, Llanrwst, Denbighshire. Edmund Colpeper signs a work at Pimperne, in Dorsetshire, "fecit, 1694." This last is of great elaboration, denoting a goldsmith's rather than a lattener's hand.

We have already expressed our belief that sculpture (representations modelled in relief, or in the round) has never been so highly esteemed, nor is it so native to England as the sister art of design—painted, drawn, or engraved representation on the flat surface: and the fact that incised brasses were so abundantly produced, and so generally adopted for monumental purposes in England, in preference to sculptured effigies, during the long period of five centuries and in so much larger number than on the Continent, would seem to strengthen that assumption. Some 4,000 English brasses are still preserved, while probably at least as many more have been destroyed. In Belgium there are about sixty-three, in Germany perhaps one hundred.

As first observed by Strutt in his Dictionary of Engravers, there is great probability that from the finer of these incised brass plates, rather than from the silvers prepared for niello by latter artists—the admirable goldsmiths of Florence in the fifteenth century—the first idea of engraving took its rise, although the happy thought of printing numerous impressions from such works did not immediately occur.

Of early sepulchral effigies in the round, cast in bronze or a kindred alloy, we have in England some of the most remarkable in point of art and of historical interest. Not all, however, are the productions of English sculptors, although native metal and marble workers aided materially in their completion. William of Gloucester, a goldsmith of the middle of the thirteenth century, cast a silver figure of Catherine, the infant daughter of Henry III. (died 1257), long since lost from her tomb in Westminster Abbey, but probably the first work of the kind executed in England. An image of silver to Gilbert de Clare was in Tewkesbury choir.

We must not fail to bear in mind that during the course of the thirteenth and fourteenth centuries numerous sepulchral effigies of knights in armour, of ladies, and of bishops were ably executed in Purbeck and other stone, probably by English hands. The Temple Church, Salisbury, Durham, Winchester, Gloucester, and other cathedrals and churches, may be referred to as still containing examples of this class of sculpture; and probably a much larger number have been destroyed.

Until the close of the preceding century the figures were rudely and stiffly modelled, but the influence of Henry II., and of the various foreign artists introduced by him—among whom probably were some sculptors—for the enrichment of the Confessor's shrine and other works in Westminster Abbey, had greatly developed the plastic and other arts. Thus we find that the tomb of King John (died 1216), at Worcester, is greatly in advance of earlier work, the life-like effigy denoting the chisel of an able hand.

The broken and neglected, and since maltreated tombs of Henry II. (died 1189), and of Eleanor of Guienne (died 1204), are at Fontevrault, doubtless the workmanship of French hands. There also is the tomb of Richard of the Lion Heart (died 1199), whose other effigy is still at Rouen. John's Queen, Isabella of Angoulême (died 1218), is also at Fontevrault, while that of Berengaria, the Queen of Richard (died 1219), is in Le Mans Cathedral, brought from the abbey church of L'Espau. It is greatly to be regretted that these effigies, from beneath which the royal dust has long since been scattered, should have been "restored" and bedizened with garish colour, before placing them together in a corner chapel of the now prison church at Fontevrault.

The sculpture on the façade of Wells Cathedral, that at Croyland Abbey, at Peterborough, Lincoln, and Lichfield, and the work of William of Ireland and Alexander of Abingdon, on the Eleanor crosses, must also be referred to as proving the ability of some of our native artists; showing an excellence of style and execution that continued during the earlier half of the following century; but after that date we find alabaster more largely and frequently used.

The beautiful monument to Queen Eleanor (died 1291), in Westminster Abbey, around which one hundred wax lights were to burn on every St. Andrew's eve, is one of the finest sculptures of this period; the effigy is of gilt bronze—a work of almost unequalled purity and truth in conception and in execution. The head rests upon two cushions diapered in gilding with the arms of Castile and León, above which is a richly wrought canopy of tabernacle-work; a slab of bronze, diapered with gilding like the cushions, forms the top of the altar-tomb, and bears the inscription in Lombardic lettering on its edge; shields of arms in metal adorn the sides. Upon the broze slab lies the recumbent figure. The marble or stone work was executed by Richard de Crundale in 1291. The bronze effigy was by Master William Torell or Torel, goldsmith and citizen of London, for work upon which he received fifty marks in 1291; and it was completed in the following year.

By Torell, also, and about the same period, was the effigy of Henry III. (died 1272), in gilded bronze, upon a tomb richly inlaid with mosaic and with slabs of porphyry and serpentine, next to that of Queen Eleanor—a work also of great excellence, in modelling and technical execution, and like the queen's not entirely in the round.

◆

MODERN BARBARISM.

TO THE EDITOR OF THE "WATCHMAKER, JEWELLER, AND SILVERSMITH."

Sir,—Whether we shall ever have free-trade in gold and silver plate, in this Queen's reign remains to be seen. Some of us say, with Milton,

> I argue not 'gainst Heaven's hand or will,
> Nor bate a jot of heart or hope, but still,
> Bear up and steer right onward.

"Great works," said Johnson, "are performed, not by strength, but by perseverance." Personally, I believe that in time we shall get it. It shall not be missing for want of perseverance.

Time appears to me to be in our favour; it is said that "'tis darkest near the approach of day." Let us hope that the latest act of tyranny on the part of an assay office may be the harbinger of a better state of things.

A few days ago, Messrs. Sibray, Hall, and Co., sent to the Sheffield Assay Office, a parcel of goods, all orders, to be assayed and marked.

By an accident, one piece, a flower stand, after a long stay (a week,) was pronounced not to be standard. So, in conformity with a law made by our ignorant and truly barbarous ancestors centuries ago, the whole parcel, although all the other pieces were pronounced to be standard, was ruthlessly broken, and, in addition, a fee of sixpence per ounce was charged for the process of smashing—very much like flogging a boy and then charging him for the birch!

Possibly your readers are not aware that—owing it is said to the strenuous exertions of that singularly enlightened body corporate, the Goldsmiths' Company of London—by the Revenue Bill, 1883, foreigners are hereafter to be exempted from this barbarous custom. Imported plate is to be sent direct to an Assay Office, and if it be found not to be of the proper standard, it is not to be broken, but is to be returned to a bonded warehouse for exportation to the land of its birth. Kind to foreigners assuredly; but let me ask, are we British silversmiths going to let this law remain long upon the Statute Book without having our share of "the milk of human kindness?" Why are our goods to be broken up?

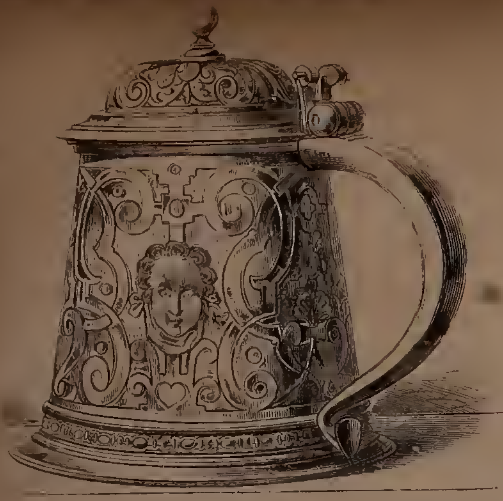
What I have wanted to know for some time past is, why we silversmiths are to be interfered with, at all, in the exercise of our vocation and calling.

No similar British industry is interfered with: why should the gold and silver trades be an exception to so good a rule? The only answer is, "As it was in the beginning, is now, and ever shall be."

Well, we must be content to wait like other trades, for reform. It must come some day. School Boards may help us. Free libraries may yet be an institution in London. It would appear to me to be impossible that the coming generation will inherit opinions so at variance with the conditions of modern thought, and practices so detrimental to modern trade.

Yours, &c.
Edward J. Watherston.

Pall Mall East,
Nov. 27th.



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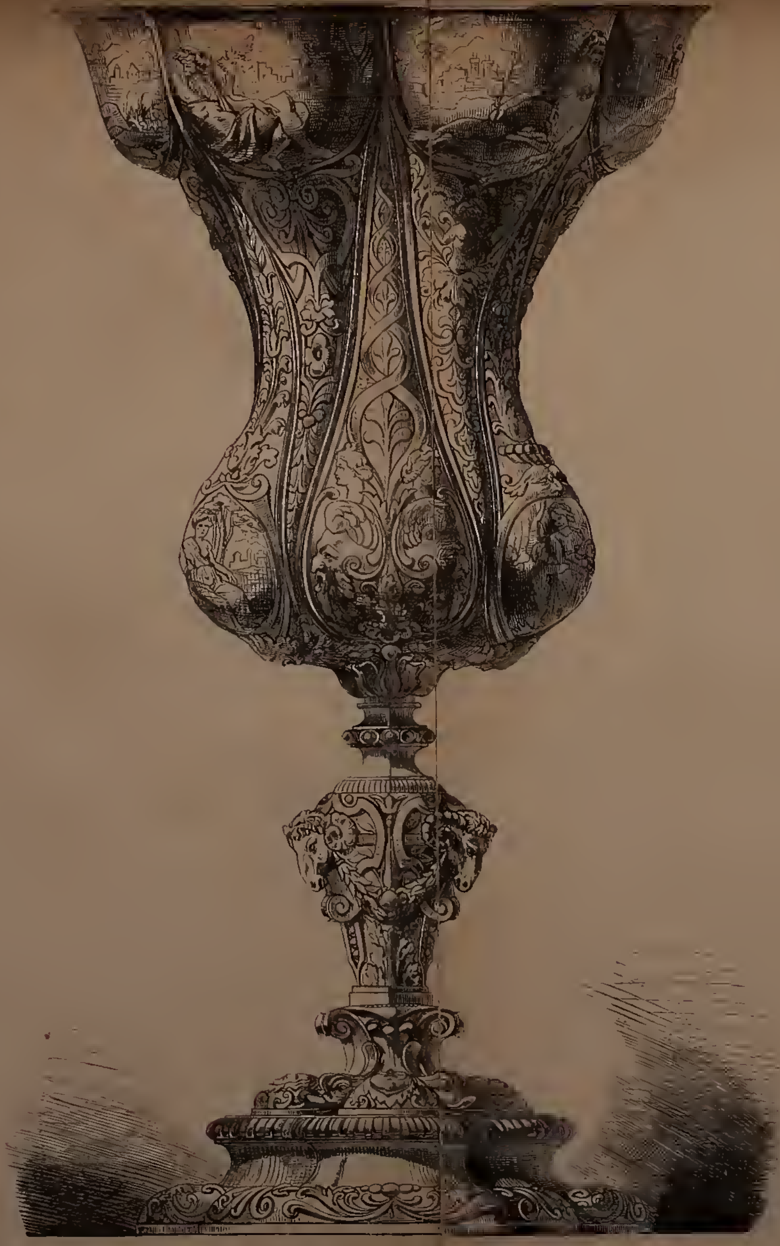

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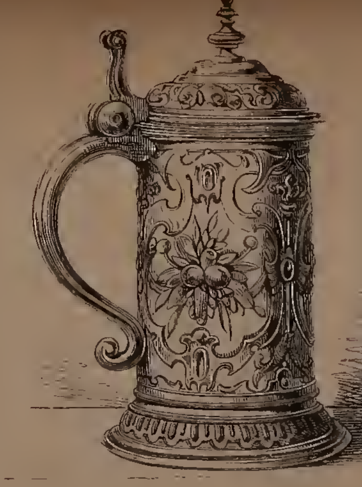

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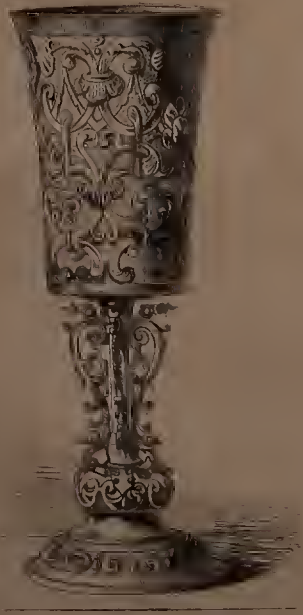

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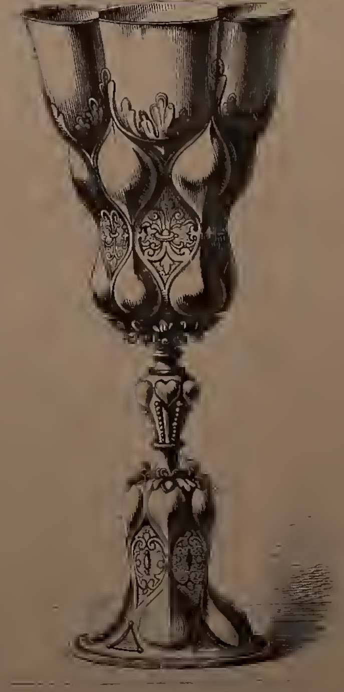

5.

1. Silver cup (Jamnitzer) in the collection of the city of Nuremberg.
2—5. Silver drinking vessels from "Ratisbon Silver find."

Specimen from the Pattern Book for Jewellers, Gold and Silversmiths published by A. Fischer, 11 *and* 13, *Saint Bride Street, London, E.C.*

THE WATCHMAKER JEWELLER AND SILVERSMITH

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ILLUSTRATED SUPPLEMENT:—"Antique Rings and Ornaments."

English and French Chronometers.

MR. E. BROWN, the representative of the house of Breguet, contributes papers to the *Revue Chronometrique*, for November and December, on the above subject; the first is devoted to a review of the results of the two last official trials of French marine chronometers, from 1st September, 1882, to 1st February, 1883, and from 1st January to 1st June, 1883, the second trial commencing before the termination of the other, by which a succession of fresh instruments are ensured. Twenty-seven were entered for the first trial; of this number 4 only were "classed," 13 were "not classed," and 10 were rejected at the commencement of the trial; this is different from the practice at our own observatory, where very imperfectly adjusted instruments are permitted to "drag their weary length along" for 28 weeks. Of the 13 not classed 8 were not observed to the end of the trial, on account of differences in their rates.

For the second trial 31 were entered, 6 of which were "classed," and 6 "not classed," 8 were excluded on account of errors in isochronism, and 8 were not observed to the end of the trial, in consequence of not being sufficiently correct in their compensation, while the remaining 3 were rejected on account of their daily rates exceeding the prescribed limit of 2s5.

The first prize, of 1,200 francs (£47 10s.), was obtained by M. Leroy, who appears to be the "Kullberg" of France. Mr. Brown writes of him thus:—

"M. Leroy, who for twenty years has nearly always held the first place (he has been first thirty times, and has obtained the prize from the Government eleven times), has submitted to these two trials some instruments of great perfection, having given some results of going of very great precision. In effect, we see at the first trial, of 4 chronometers classed, 3 are Leroy's, and in the second trial, 5 out of 6. M. Leroy has also been fortunate in securing the order for a watch offered by the Minister of Marine to the first scholar of the Naval School, for which a special trial was held."

We should like to relieve the monotony of this paper by a slight digression on competitive trials or examinations. It is not universally accepted that the most useful instruments or candidates are always to be obtained from them. A gentleman in a Government office, who for a quarter of a century has ably performed his duties, recently said that if he had to pass an examination he would be "ignominiously plucked," and there is no doubt that many fine-going chronometers and watches owe their success to the existence of conditions which render them unfit for the contingencies of ordinary wear. These remarks are made without individual bias, and we do not expect that their correctness will be challenged. But let us return to our "Chronometers."

In the second paper, Mr. Brown enters into a searching comparison between the respective merits of the eight best instruments at the last Greenwich trial, and the corresponding number of French, the result being to demonstrate a slight superiority on the part of the latter. We do not mean to weary our readers with figures in this paper, as they might interfere with their New Year's enjoyments, but prefer to place "main issues" before them.

Mr. Brown goes very minutely into the commercial part of the question, with regard to the position and prospects of the French chronometer trade, but some of his premises are erroneous, as we shall presently show. He says:—

"From the commercial view, the situation of the makers in France and England differ greatly; in effect, we see only three makers submit 31 chronometers to the French trial, while 40 are submitted to that in England, by 24 makers. It is then 10 instruments a maker in France for one and a half in England."

Of course Mr. Brown only refers to the "proportion" in in the latter estimate, but as a matter of fact, we know that 16 chronometers were deposited by two manufacturers. The names on the list give no idea of the real state of the trade, they can be narrowed up to a dozen *bonâ-fide* manufacturers. The same thing applies to the German trials, at which it is well known that some of the instruments are of English origin, whereas, we believe, that those entered for the French trials are what they profess to be, viz., of home manufacture. Notwithstanding, however, that the latter are supposed to be of surpassing excellence, Mr. Brown laments that their sale is unhappily limited to the requirements of the State navy, and some large maritime lines of vessels, also, that the purchases of the State at the end of the trials have notably diminished for some years past. [Just our case.] From 1871 to 1881 the average was sixteen yearly, since then it has diminished to half. We really regret having to bring these facts into prominence, and hope that the Hydrographer will not be influenced in consequence, but it is probably in consequence of the increased size and armament of the men-of-war of the present day. Gunboats of lighter draught and tonnage are more manageable, and we throw this hint out to the Lords of the Admiralty; it has been suggested to us by the recent action of the Government of Victoria, who are looking after their home defences.

Mr. Brown takes a serious view of this falling-off in the purchases, however. He says:—"This diminution of the pieces purchased, coincident with the application of the new programme adopted for the trial, raising the real merit and courage of our makers, nevertheless imposes great sacrifices upon them, by reason of the large number of instruments that they must have rating or in course of construction—a number quite out of proportion to the sale or out-put. In effect, in order that a maker may follow the trials regularly with a chance of success, he must possess a certain number of finished and rated instruments, among which he chooses, for the trials, those which appear to him the most perfect. The introduction in the programme of the trial of isochronism considerably increases the time required for adjusting. To enable a maker to send twenty chronometers to the two trials of the year, he must have at the least fifty finished and rated in his workshop. These fifty chronometers represent an important capital, not only remaining a long time unproductive, but in addition an expense (on account of the work required in rating). It can then be said, after the preceding observations, that the manufacture of marine chronometers in France brings more *glory* than *hard cash* to those engaged in it." English chronometer makers of the present day will agree with the last sentence, but we now have to seriously dissent from Mr. Brown's further advice and reasoning. He says:—"It might, however, be otherwise if the mercantile marine, if the French shipowners, encouraged and, more than that, supported the national industry by buying chronometers of French make, instead of addressing themselves to English makers, *as they do too often*. If in France the watchmakers had the assurance, or at least the hope, of a demand for marine chronometers, it could certainly be said that a larger number would occupy themselves in the construction of these instruments, for it would be undervaluing French horologists to believe that the fact of three makers alone, appearing at the French trials, as against 24 at the English, constitute a superiority for the latter, from a horological point of view, over the former. It is not more difficult to construct a chronometer in France than in England, and the trials at the marine depôt prove, for fifteen years and more, that the French artists cede nothing to the English on the point of adjustment; while in the execution, the hand-work, the superiority is perhaps on the side of France.

"From the fact that the English makers have each only sent two chronometers to the trial, it must not be supposed that these makers only keep one or two special instruments for it. [Mr. Brown should understand that each maker is *limited* to two.] England sends her chronometers into every country, and as the makers are nearly always certain of 'placing' their products, it follows that the trial offers less interest for them as regards the number of pieces 'classed' than in France; each maker keeps his instruments in view of the requirements of commerce, reserving for the trial some exceptionally well-adjusted chronometers, or such as have some new application, new system of compensation, &c., &c.

"The number of makers, the acquired reputation—[we feel pleasure in writing this]—the facility that the navigators have of procuring the instruments of which they have need, and to exchange any that may be defective or unsteady in the numerous depôts that the English have established, in the large seaports, and also the relatively low price—[this is unhappily true]—renders the competition difficult for all other nations less well furnished. Also, it is not exactly from this point of view that we shall be able to seek to extend the manufacture of marine chronometers in France, at least for the present, but would it not be natural that at least all the French ships should be furnished with chronometers of French construction? [What about English watches for the English?] The thing ought to be possible; it can depend for a little on the makers themselves, and as much on those who require them, who supply themselves, and who go, *by habit* let us believe, to seek their instruments of English houses, without imagining that they will be able to have as good, quite as good, in France; and above all, in buying French chronometers, they will not only encourage French makers, but they will contribute to the raising up again of our art, in aiding it to re-conquer the eminent place that it formerly occupied in the time of Le Roy, Berthoud, and Breguet, the great masters of the chronometrical art."

Mr. Brown says, in conclusion, that French marine chronometers are at the present time in all respects equal to the English, but that the commercial situation of the makers differs very considerably in the two countries. He thinks there is a way to remedy this, and hopes that his remarks will draw forth expressions of opinion from other horologists as to the best means of making the manufacture of marine chronometers in France a prosperous one.

We return him thanks for his interesting papers, which have afforded us the materials for our first article this year. English chronometer makers must prepare for the coming French invasion; in the meantime we wish them all, including Mr. Brown, whom we have met in Paris, a happy and prosperous New Year.

Words to Watchmakers.

An Address delivered in the Parish Church of Clerkenwell, in behalf of the Clock and Watchmakers' Asylum, New Southgate.

By the Rev. Robert Maguire, D.D., Rector of St. Olave's, Southwark.

"So teach us to number our days, that we may apply our hearts unto wisdom."—Psalm xc. 12.

SOME of the grandest and most practical moral lessons of the Bible are those that are derived from the fleeting divisions of time. There are, indeed, very few references in the Holy Scriptures to any mechanical means of time-keeping. Such, if they existed at all, must have been of rude formation, involving the merest elements of mechanical science. The first allusion we have to such is in the reference to the sun-dial of King Ahaz (2 Kings xx. 2), and so primitive was this as a mechanical construction, that it is supposed to have to have been a staircase, or flight of steps, so ingeniously contrived as to mark the lengthening or decreasing of the shadows caused by the sunlight. Allusion of a similar character may possibly have been in the mind of the writer of the Book of Ecclesiastes, when he says—"Or ever the silver cord be loosed, or the golden bowl be broken, or the pitcher be broken at the fountain, or the wheel broken at the cistern" (Eccles. xii. 6), a description which, besides referring to the windlass machinery of the well of water, might also have referred to the ancient *Clepsydra*, or water-clock.

Failing the modern mechanical contrivances for keeping count of time, the writers of the Holy Scriptures fall back upon the natural divisions of time, that is, those marked out by nature. Thus, the "new moon" plays an important part in the calendar of the ancient Jews, indicating the lunar period, or period of the "month;" and one of these months was to them the "beginning of months," thus making their "New Year;" and day by day they observed the sunrise and the sunset, and the seventh of these returning days was their Sabbath, thus constituting the Jewish "week;" and the day and night were further subdivided into their respective "hours" and "watches;" and thus we read of the "third hour," and the "sixth hour," of the day, &c.; and of the "cock-crowing," and other watches of the night. And so, what with the rising and the setting of the sun, and the periodical return of darkness and light; and what with the waxing and waning moon, and the conscious increase of years and age, and with other marks and indications of the passing periods, there was a consciousness of the existence of Time, and of its continual motion and advance, waiting not for any circumstance, or halting at any man's call.

And, indeed, so conscious were the ancients of the existence of Time and its operations, that the most instructive of the teachings of their mythology were derived from this source. Out of their rude and unscientific observations they contrived to hit off some wonderful and telling truths, which Nature taught them. Thus, looking out upon the distant horizon, and observing how it was that heaven and earth met together and kissed each other, they fabled out the marriage of the twain (Cœlus and Terra); and the issue of the wedlock was Saturn or Chronos,[*] the god of Time. Chronos was told that he would be overpowered by his own sons; and he accordingly took the precaution to destroy his children almost as soon they were born. One of these, however, was hid by Rhea his mother, and thus saved from the effects of his father's sword; this was Jupiter, who afterwards sat upon his father's throne, and was called the king of gods and men. And is not this all perfectly true in the actual experience of man? Time, all devouring Time, spares none of its offspring. Family after family, age after age, generation after generation—all these are born but to die. The open mouth of the devouring grave swallows up all—"In Adam all die." But one of all Time's offspring has survived—the King of all, the "Lord both of the dead and of the living;" and in Him all shall live again—"Even so in Christ shall all be made alive."

Then again, the myths of the ancients pictured Time as an old man—very old, with furrowed brow and channelled cheek; with outspread wings, to indicate the rapidity of his march; with the admonitory hour-glass in his left hand, showing how the sands of time are fast decreasing; with the mowing sickle in his right hand, the emblem of the ravages of his career; and with the fabled forelock upon his brow, to say that you may possibly anticipate him, but, once past, you can never overtake him.

"And, lo, the forelock on his brow!
Hear ye the lesson it doth speak;
Once past, what speed can e'er pursue?
Or, if pursuing, overtake?
Time slowly comes, 'tis quickly past;
Anticipate, and hold him fast!"

So what with their natural observation of men and things, unaided by watches or clocks, it was part of their natural religion to "number their days," with, no doubt, the great moral and spiritual lesson besides, that "they apply their hearts unto wisdom." To-day is the precursor of to-morrow, as it is the sequel of yesterday; and these three words have ever been in the human vocabulary—Yesterday, past and gone for ever; To-day, the present moment, the only available season a man can count upon; To-morrow, the future, unborn, and, to you and me, may never come at all. There is One, and only One, who is all three together—"Yesterday, to-day, and for ever." He is Time's conqueror; it is no dead-heat, but the One outwalks, outruns, outlives the other. Yea, Time, that has outrun and outlived so many, shall himself be beaten at the last.

"Art is long, but time is fleeting;" and yet it is not so long ago since the dawn of the more advanced period of the art of watchmaking. Down to the time of the Reformation but little had been done in this direction. Some very remarkable specimens of *clock*-making existed;[*] but the principles of the science of *watch*-making were then unknown. With the dawn of the seventeenth century we come upon the period of watch-making; and from that time, for full 250 years past, the progress of this science has been slow but sure; and to your art, here in this parish of Clerkenwell, not only horology, but also astronomy and practical commerce, owe much, and almost everything of their modern developments. It stands to reason that clocks, being of the ruder formation, should come first, and that watches, being of the more delicate construction, should come later in the field of discovery. Huygens and Hooke were beginning their career just as the celebrated Galileo was ending his, about the middle of the seventeenth century. It was through the joint labours, or rather contemporary and independent discoveries, of these two men that things were advanced beyond the position in which Galileo had left them. It is hard to say which of these two, Huygens or Hooke, is to be credited with the discovery which ultimately developed the clumsy motive power of the weights of the clock into the portable and delicate motive power of the watch-spring, and, afterwards, of the hair-spring or spiral spring of the watch. Hooke's celebrated axiom, "Ut tensio, sic vis," seems to identify the discovery with his name and labours. "As the tension, so the force" was the parent of the motive-power of the watch, suggesting the idea of elastic force instead of gravitation. And what a grand motto for a useful life! As you bend to your work, and put forth your strength, you will win! The Dark and Light Blue on the waters of the Thames would tell you that—striving for the mastery.

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[*] From whence our words "Chronology," "Chronometer," &c., indicating the science or mechanical measurement of time.

[*] So early as the year 1288, in the reign of our Edward I., a turret-clock was erected in the tower of Westminster.

I have not time here to enter on a detailed historical narrative of the successive steps and stages of watchmaking. I may, however, mention that the next two masters of the craft, after Hooke—Tompion and Graham—have been honoured with a burying-place in Westminster Abbey. Next after these, Harrison, of Faulby, near Pontefract, occupies the field, as the discoverer of longitude at sea, the basis of modern commerce. Then follow the names—once famous in this locality, where many of my present audience are famous now—of Mudge, Le Roy, Earnshaw, and Arnold; and so the list of masters descends to this very day, when so many eminent and successful traders and manufacturers carry forward this scientific occupation; so that to specify any would be an invidious task.

This leads me on to the purpose that brings us together to-day. You must know that among the characteristics of this trade is the physical wear and tear it involves on the workers. The extreme tension of the more delicate organs, of sight and touch, of the eye and the fingers, predisposes the workmen to a premature breakdown of those powers. So delicate, indeed, is this workmanship, as to have raised the cry on the part of some that it is *woman's* work, rather than for men to do it. This plea, however, you are aware, has never obtained any acceptance in your locality. This much, however, is clear, that the wear and tear of ordinary work is intensified among you by these special causes, and that in too many cases a premature disablement is the consequence. To make provision, then, for such a premature break-down, and, at all events, for the inevitable infirmities of age, this asylum has been established at New Southgate, with the history of which I have been myself identified almost from its commencement. Although this benevolent scheme was instituted in 1853, it was not until 1857 that the first stone of the present asylum was laid. The asylum then built, and since then greatly enlarged, is now justly regarded as the pride of this scientific trade, and promises long to serve as a blessed home of refuge for the weatherbeaten members of your honourable craft.

And those timekeepers of your manufacture are in themselves great monitors of time, ticking their seconds, chiming their quarters, striking their hours, and tolling the death-knell of age after age, and of man after man. What accuracy it needs to keep true pace with the sun, which is always true!—to keep true to a standard that doth not vary, and that never errs, that "father of lights," of which it may be said, as it is said of Him that created it, "With whom is no variableness, neither shadow of turning" (Jas. i. 17). It is a march with Time itself, step by step, on and on, through life to death.

"And our hearts, though stout and brave,
Still like muffled drums are beating
Funeral marches to the grave."

The pulse may beat fast or slow, may be feeble or feverish, but time ticks steadily on, in its unvarying, monotonous isochronisms. Life, when it is run out, is like a broken watch-spring; but, meanwhile, the momentum of time is held in check, and under the restraints of natural law, until the end.

But the sun is the standard of all true time-keeping; and how searching and severe is the scrutiny!—a moment wrong, you are out of time, and there is an error somewhere. The deviation of a few seconds a day lost Harrison his first and second venture for the national challenge of £20,000 for the discovery of longitude at sea, and it was not until he had improved or reconstructed his chronometer to an almost imperceptible deviation, that he won the day.

Even so are we in the sight of God, the Standard of all that is true and all that is good. We are by our fallen nature out of repair; badly made and badly set; badly using our powers, or badly used; sometimes wilfully going wrong, or refusing our periodical winding-up, and sometimes losing ground for want of a due maintaining-power; and sometimes we turn rusty and cranky in our relative action, schisms spring up in the body, and little or no sympathy or co-operation exists among the constituent members. How, then, under these circumstances, are we to keep good time, or to answer offhand to the call of Tell-truth in the heavens?

This, then, is our appointed standard of judgment and appeal; and *whoso faces the Sun of Righteousness is right!*

"True as the dial to the sun,
E'en though it be not shone upon."

Circumstances, responsible circumstances, place men in different positions, but they may be serving God all the same. In the market-place of the City of Lyons I have seen a watchmaker's shop with a row of fifteen or twenty clocks, showing the time of day in Lyons, London, Paris, Berlin, Calcutta, Sydney, New York, &c. Now, all these were wrong, except one, from my point of view; but in the positions toward the sun of the places they represented, they all were right. God measures us, not by our relative standard of each other, but by the positive standard of *Himself;* and, therefore, I once more boldly say that *whoso faces the Sun of Righteousness is right!* There may be different principles of construction, and different modes of work, and different climates to work in, but if integrity be the mainspring, the Word of God the regulator, and Conscience the refined and delicate hairspring giving the time to our vibration, and Christ the Key, to set us going and to keep us going; and if our "hands" never weary of the "daily round, the common task"—then your time of day is the true time of day all the world over, and all is well; remembering the suggestive lines of Francis Quarles on this subject:—

"Time's an hand-breadth, 'tis a tale;
'Tis a vessel under sail;
'Tis an eagle on its way,
Darting down upon its prey;
'Tis an arrow in its flight,
Mocking the pursuing sight;
'Tis a short-lived, fading flower;
'Tis a rainbow on a shower;
'Tis a momentary ray,
Smiling through a winter's day;
'Tis a torrent's rapid stream;
'Tis a shadow, 'tis a dream;
'Tis the closing watch of night,
Dying at the rising light;
'Tis a bubble, 'tis a sigh—
Be prepared, O man, to die!"

[Although some years have elapsed since the delivery of the foregoing admirable discourse, we are glad to have the opportunity of bringing it before the notice of our readers; to the best of our knowledge it has not appeared before in any organ of the trade.—Ed.]

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"Our Prize Essay."

We very much regret that our offer of £50 for the best essay on the "Going-barrel Watch" has met thus far with but little encouragement, only one essay having been sent in to us. This is of course no competition, and after consulting the judges connected with it there is no alternative left to us but to follow the precedent of other journals and institutions. Our desire is naturally to benefit the watch trade at large, and our readers in particular, and we hope that by prolonging the time of sending in the essay for another six months many more will be able to take part in this competition, which we intend to be an introduction only to similar ones. The editor will be pleased to receive and reply to any communications referring to the prize.

The Worthies of Horology.

By C. Stuart Murray.

XVIII.

THE CLOCKMAKERS' COMPANY.

Fifth Part.

THE COMPANY went in early for "protection" in their trade. It does not seem as if they wanted it then to the same extent that it would be beneficial now. Instead, however, of "going in" for protection they turn the foreigners to their own profitable account; that is, they sell his watches and clocks and make money out of them.

At a monthly Court held on the 5th of February, 1787, it was resolved, "That it is expedient, for the protection of the home manufacturer, that the duty upon foreign clocks and watches should be enforced;" and a committee was appointed accordingly. This resolution refers to one of the most curious anomalies in connection with English legislation; and that is the anomaly of what I will here call "Dead-letter law." A measure is brought into Parliament, read, debated, amended, re-amended, and all the rest of it, and after the law-making mountain has been ever so many weeks in labour, out comes the mouse. After the said mouse has been stared at for a while, it runs into a hole, remaining there, and very little more is heard of it until some contingent earthquake brings it forth again. Sometimes it happens that it is nobody's business to look after it, as could be easily shown. Perhaps one of the most forcible illustrations of this dead-letter law that could be given is very close to our own doors. Most Londoners know what was formerly called the New-road between Paddington and the City. When that road was planned it was intended to be shaded by trees upon both sides after the manner of a Parisian boulevard. It was made in accordance with that design, and great pleasure was hoped for from it. By and bye, however, little sheds of shops began to jut out upon the land that formed the fore-courts of the houses between them and the footway. Then followed bricks and mortar, and after that substantial, permanent houses in numbers; but chiefly the projections for shops. Things went on in that way without any questioning by any one until the advent of the Underground Railway, which advent produced the first "hitch," and let in the light upon the subject. In boring for the railway, one of the projected buildings that formed the public bar to a large tavern gave way. The owner, naturally enough, applied to the railway company for compensation, but was answered that there was none for him. Further investigation revealed the fact that not only the tavern extension, but every building that had been put up along the whole line of road, about three miles, had been put up illegally, and had no manner of right there. Furthermore, although the Act clearly specified that, one important part had been left out; that was, that no provision had been made to constitute it anybody's business to enforce the law! Had that been so, and the law duly put into action, the entire line of that road. from the corner of Old-street upwards, would have been as it was originally intended, that is, open and lined with trees. The tavern-keeper was in a bad plight; that is, that he was in the wrong, in this way. Although there was nobody to enforce the law against building upon those fore-courts, still, no one could take advantage of his own wrong for all that. It was, therefore, held that before he could recover damages, the burden of proof rested upon him to show that he was rightly placed upon that land. He could not show that, hence he was out of court. On the other side of the question, had the original part of his house been affected by the railway, he could have recovered damages so far as it was concerned; but had both the house and the projected bar come down together, he could only have recovered so far as the house was concerned, but would have been in the same position with respect to the bar as he was in the first instance. This is an instance of dead-letter law in our time that swings into that of the Clockmakers' Company almost to a tick.*

The resolution to which the company had come 1787 was in consequence of the dead letter of a former reign. In the year 1698 an Act was passed, the 9th William III., c. 28, for "protecting both the trade and the public against certain fraudulent impositions then practised by foreigners and others." The second clause of this statute went on to say that "great quantities of boxes, cases, and dial-plates for clocks and watches have been exported without their movements, and in foreign parts made up with bad movements, and thereon some London watchmakers' names engraven, and so are sold abroad for English work; and also there hath been the like ill practice in England by divers persons, as well as by some professing the art of clock and watch making, as others ignorant therein, in putting counterfeit names, as also the names of the best known London watchmakers, on their bad clocks and watches, to the great prejudice of the buyers, and the disreputation of the said art at home and abroad." Another part of the Act laid it down that it was contrary to law what had been done, and in order to put a stop to it, it was laid down that, for the future, no case or dial-plate should be exported without the movements, nor without the maker's name and place of abode engraven on every such clock and watch, under a penalty of forfeiture and a fine of twenty pounds. It became further necessary to pass another protective act in the 27th of George II., about the year 1754. But between the passing of the two Acts the company had not been idle. A second Court, a special one, was held in the February of 1787, when it was resolved that the following representation be addressed to the Lords of the Treasury and the Lords of Trade:—

"*To the Lords of the Committee of the Council for Trade.*

"My Lords,—

"The Master, Wardens, and Assistants of the Fellowship of the Art or Mystery of Clockmakers of the City of London beg permission to offer the copy of a representation drawn up for the purpose of presenting to the Lords Commissioners of His Majesty's Treasury, stating certain grievances their trade labours under, and humbly to request your Lordships' assistance in obtaining the desired redress.

"In the first instance, we humbly conceive it our duty to inform your Lordships that great numbers of foreign clocks and watches have been for some time past clandestinely brought into this country and exposed for sale, which numbers are daily increasing, to the great detriment of His Majesty's revenue, and very injurious to the manufacture of those articles in this country, for which reason we presume it has become highly necessary to enforce the duties which are by law prescribed on the importation of such goods, and which are at this time generally evaded.

"By inquiry at the Custom-house, it appears very few, if any, such foreign clocks and watches brought into this country are there entered; and from the facility of introducing such goods, by reason of their being so very portable, it will be difficult to oblige the importers of such articles to make regular entries of the same.

"Since the treaty with France has been generally known to the public, the clock and watch-making branches are thought to be in most danger of suffering; this opinion we consider is founded upon such just grounds, and is of so much consequence to our manufacture, that it requires the most serious attention of the Legislature; for if those foreign articles should continue to be brought into this country without paying the said duties, it must be inevitable ruin to our manufacture of clocks and watches, as such illicit trade will increase when the intercourse between the two countries becomes more frequent, without any method of discovery.

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* We fail to see the connection between this paragraph and the subject which is presumably being dealt with by the author.—Ed.

"With submission to your Lordships, we are of opinion, if the following regulations were to take place, they would in a great measure remedy the evils complained of, be truly beneficial to the revenue, and of important service to this manufacture:—

"The Master, Wardens, etc., of the said Company for the time being, to be empowered to strike or affix a certain mark on all foreign clocks and watches imported; and if found necessary or expedient, to be further empowered to receive the duties thereon, for the benefit of His Majesty's revenue, under such restrictions and limitations as your Lordships may hereafter prescribe.

"That it shall not be lawful for any person to expose such articles to sale, without the said duty-mark being first struck or affixed thereto, and the duties paid thereon, under the penalty of —— or forfeiture of the goods.

"If such clocks and watches shall at any time be brought to the clock or watchmaker, or any other person to repair, it shall not be lawful for them to amend or repair the same, until the said duty-mark is struck or affixed thereto, under the penalty of ——.

"The present possessors of such clocks and watches to be allowed a convenient time to bring or send such articles to the place appointed, to be there marked, in order to distinguish they were imported previous to such regulations, or that their clock and watchmaker may be allowed to get such goods marked for the said time, free of expense.

"If it should be considered such regulation would effect foreigners travelling in this country, the remedy is easy, by giving power to the said Masters and Wardens, to grant licenses to foreigners to get such watches repaired during their stay here, for their own use; but it shall not be lawful for them to expose to sale such clock or watch, until it has received the duty-mark, and paid the duty thereon.

"A given power to the Master, to change the said mark once a year, or oftener if found necessary, and to appoint deputies in different districts, for the purposes before mentioned, subject to the control of the Revenue Officers in that district.

"Authority to seize all such foreign articles before named, if it shall appear such duty-mark is copied or imitated; which goods shall be forfeited for the benefit of the State, and provision made to free the company of any expense attending the execution of such regulations.

"As the duty on the articles above mentioned is laid *ad valorem*, it is humbly presumed, that the Clockmakers' Company are more competent to detect any fraud that may be offered to the Revenue by an under-value of such goods, than any other persons, as their experience in the various branches of this manufacture renders it wholly improbable that such frauds can or may be put in practice.

"The disadvantage the manufacture of this country labours under, in the article of watches is great; the duty of eight shillings per ounce on our wrought gold plate, gives the foreign article the superiority in our market, which we consider as a substantial reason why the duty on such articles should be enforced, particularly as the great influx of foreign watches herein complained of consists chiefly of gold; farther, it appears reasonable to us, a countervailing duty of eight shillings per ounce should be laid on all foreign-wrought gold, and sixpence on silver plate, as an addition to the reduced duty of 27½ per cent.

"The foregoing regulations, if considered as calculated to remedy the evils complained of, could not be offensive to the Court of France, as we understand they are in the practice of a similar mode of marking all foreign clocks and watches brought into that country."

"The following extract from the ordinances made in pursuance of the Charter of this Company, ratified and confirmed by—

"'THOMAS, LORD COVENTRY, Lord Keeper of the Great Seal; Sir THOMAS RICHARDSON, Knight, Lord Chief Justice of the King's Bench; and Sir ROBERT HEATH, Knight, Chief Justice of the Common Pleas,'

"Sheweth,

"Article 34th.—'Item. It is also ordained, that all clocks, watches and larums, and all cases for clocks, watches and larums, plaine or graven, made of metals, or of any other nature, condition, or fashion whatsoever, or any other work or works, as sun-dials, mathematical instruments, or any other work peculiarly belonging to the art of clockmaking, be it for great or small, brought into the Realm of England, or Dominion of Wales, from the parts beyond the seas, to be put to sale, shall be first customed, and then brought to the Hall of the said Clockmakers of London, or their meeting-place. and there presented to the Master, Wardens and Assistants, to be viewed and approved of, according to the said Letters Patent of Incorporation; and upon the approbation of the Master, Wardens, and Assistants, or the great part of them, shall, according to the usual custom of the said Company in such cases, receive the mark or allowance of the said Company, before the same be offer'd or put to sale, upon pain of such reasonable penalties as by the said Master, Wardens, and Court of Assistants, or the more part of them (whoreof the Master, and one of the Wardens for the time being, to be two), shall in such case appoint and ordain.'

"Notwithstanding the powers granted by the above-recited Ordinance, we find it totally ineffectual to answer the purposes intended, as it is thereby directed, such goods shall be first customed, which, for the foregoing reasons, and the want of regulations to enforce obedience to the same, such law never has or can be enforced without the interposition of the Legislature.

"From all which premises we would conclude by observing, with humble submission to your Lordships, that the manufacture of clocks and watches in this country is entitled to every possible encouragement and protection, as a very great part of its value consists in labour, and appertaining to the employing many thousand artists in its various branches, to the great benefit and advantage to the State.

"The great attention your Lordships constantly pay to the manufactures and commercial interest of this country, emboldens us to hope, this our Representation will be considered as entitled to your Lordships' countenance and support.

"Signed and sealed, by order of the Court, the 22nd day of February, 1787. "FRANCIS ATKINS, Clerk."

It will thus be seen that even at that comparatively early period the Company had its troubles, and seemed to be struggling towards manhood along thorny paths. I am not aware that the information published here has ever been known beyond the circle of the Clockmakers' Company, and on that account will be valuable as showing the internal condition of the trade in those days. As now, the duty upon gold and silver was a constant source of annoyance, and protection by penalties seemed to be the true form of guardianship against encroachment.

The "Representation" that has just been given was laid before the Lords of the Treasury in due course, and it led to an interview with Mr. Rose, the secretary. The Master, accompanied by a deputation of the Court, saw Mr. Rose, and after the usual interchange of official courtesies, the following Monday was appointed for the further consideration of the subject. Accordingly upon the 2nd of April, 1787, the Court attended again upon the Minister. He told the members that he found the contents of their Representation of much more importance than he at first imagined. He allowed the reasonableness of the propositions contained therein, and that during the Easter recess, Mr. Pitt and himself would consider them. Nothing further was done in that direction, and the Company took in hand the advisibility of laying their grievances before other and higher powers then even secretaries of the Treasury.

C. S. M.

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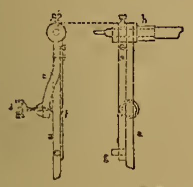
A New Pendulum Crutch.

By H. Sievert.

From the "Deutsche Urmacher Zeitung."

Fig. 1 shows an arrangement for adjusting the beat or drop. The crutch *a*, together with the collet *b*, is mounted barely friction-tight on the arbor of the pallets, and is kept in position by the piece *c*, which is firmly attached to the same arbor. The piece *c* has a stop screw, and on the other side a moderately strong spring *f*, which is resting against a pin *g* inserted in the crutch. The position of the crutch is therefore under firm control of the stop screw *d*. The position of the screw, relatively to *g* and *b*, excludes any uncertainty in the fitting of the crutch on the pallet arbor, especially if *b* is left slightly friction-tight. This adjustment adds but little to the weight of the rod, and least of all to its lowest end.



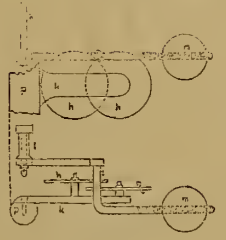


Fig. 2 represents a peculiar pendulum guide. To the pendulum rod P is an armature *k* attached, which carries on two axes the discs *h h*. Against these discs the guide-pin *i* is resting, the carrier of which, together with the collet to which it is attached, is moveable about a stud in the crutch. To the bent end of the guide-pin is a ball screwed on, which acts as a counterpoise to the crutch, and relieves the pallet arbor of excessive pressure. The three points *m i l* are in a straight line, to reduce the friction at *l* as much as possible. The guide pin *i*, together with the discs or friction-rollers *h h*, can be placed on the other side of the plane of rotation of the crutch, whereby, however, the impulse is given under less favourable conditions.

The advantages of this arrangement are the following:—The rollers *h* and *h* reduce the friction of the contact to the smallest possible amount, and an adhesion of the guide-pin cannot happen, since no oil is required. The contacts are made under slight pressure, whereby any error by shake is avoided, hence the whole impulse action is transmitted to the pendulum, which is most important in clocks with small impulse-angles. And, lastly, no damage to the points of the escapement-teeth can happen, as the action of the friction roller allows a free rotation of the guide-pin.

Secrets of the Jewellery Trade.

In the Lord Mayor's Court, on the 31st ulto., before the Recorder and a Common Jury, the case of "Ricards *v.* Abrahams" was heard.—This was an action brought by the plaintiff, a dealer in precious stones, of 236, Southgate-road, against the defendant, a jeweller, of Houndsditch, to recover the sum of 17*l.* 14s. 4d. for a parcel of imitation sapphires sold and delivered. The defendant pleaded a denial of liability, alleging that the supposed stones were sold to him as real and turned out to be imitation.

The plaintiff's case was that on September 20th last, he met the defendant in the street and offered him a parcel of imitation sapphires, known as "Beryl sapphires." Mr. Abrahams referred him to his son, who was at home, and that gentleman purchased the parcel for the sum now sued for, having till next morning to decide upon the matter. He had, however, subsequently refused to pay for them, alleging that they were not as represented "inferior sapphires."

For the defence the defendant's son was called, and said the plaintiff represented at the time he brought the parcel to him that the contents were real stones but of an inferior quality. He sold some of them at a small profit to his brother-in-law, a jeweller, who gave him a cheque which he stopped two hours later, informing him the supposed stones were nothing but "paste" and worthless. He thereupon refused to complete the purchase.—In cross-examination he said he had been in the habit of buying and selling sapphires, but only when "mounted up." Their value then was according to their setting. He was no judge of sapphires. He was aware that the invoice was for "Beryl sapphires." He did not know that the word "Beryl" meant imitation. He thought it was a mere description of the stones. He was a jeweller, and dealt in nine, fifteen, and eighteen carat gold and silver goods.

Mr. Alfonso Nourick, a lapidary, carrying on business at 11a, Upper Gloucester-street, W., said he had examined the supposed stones. They were of the commonest kind of imitation known as "paste," and sold by the gross.

Mr. Geoghegan.—What does "paste" mean?

Witness.—A mixture of violin glass and borax. (Laughter.)

Mr. Geoghegan.—And what are "imitations?"

Witness.—I make imitations, but I make them out of real stones.

Mr. Innis.—How can that be?

Witness.—I will tell you. Perhaps I have some pale stones which would not be valuable. I split those; introduce the colour desired, and then join them again. (Laughter.) By that means the public get real stones at a cheap rate representing stones of a greater value. (Renewed laughter.) I never heard of a "Beryl sapphire." "Beryl" is a valueless crystal of various colours, but would mean "real," and therefore I should consider a "Beryl sapphire" to mean a "real" stone.

Another witness (Mr. William Jennings) was called, who examined the supposed stones and pronounced them to be paste.

Mr. Innis.—Are they well got up?

Witness.—Yes.

They would take anybody in, would they not?—That is exactly what they were intended to do, I should think. (Loud laughter.)

Ultimately the Jury found a verdict for the defendant.

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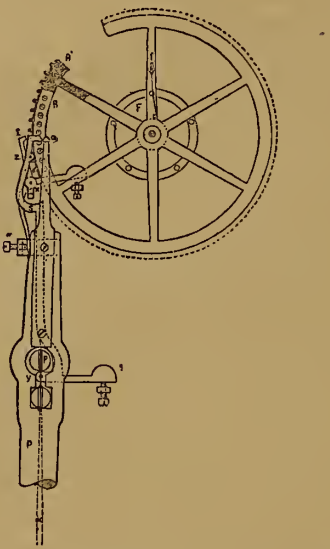
Buyers of gold in the Transvaal are now required to take out a license, for which they have to pay £40. The price of gold at the mines has gone down from £3 17s. 6d. to £3 7s. 6d. per ounce.—*The Globe*, Dec. 15th.

An Improvement in the Pin-Wheel Escapement.

By Joh. Neher, of Munich.

From the "Deutsche Urmacher Zeitung."

The construction shown in the sketch is applied to turret clocks with *remontoir* trains, that is, such clocks where the weight does not act direct on to the escapement, but has simply to propel the hands and rewind a spiral spring at intervals of one minute, which again unwinds itself in the act of propelling the escape-wheel, or maintaining the impulse action for that period.



R and R' (see figure) are two escape wheels concentric with the axis of the spring-box or barrel F. The front wheel R has pins set vertically to its plane, and the back wheel R' has teeth projecting in the usual way. Provision is made for a small angular rotation of wheel R' independent of that of R, by the action of the spring *f*.

The bell-crank lever detainers *s* and *t*, movable about the centres *y* and *x*, act respectively into the escape wheels R and R', the positions of their surfaces, facing the direction of the rotary motion of the escape-wheels, being adjustable by stop-screws and counter-weights. The pendulum rod P, suspended from two springs at *p*, has a projection above the point of suspension, which carries the impulse plane *a*, as well as the pendant and stop-screw *w*.

The action of the escapement is thus:—When the pendulum is at zero, the teeth of the wheel R are reposing on the locking-face of the detainer *s*, and the teeth of the wheel R' on that of the detainer *t*. If an impulse is given to the pendulum from right to left, the section of the pendulum above the suspension moves from left to right.

In virtue of this motion, the bell-crank lever detainer *t* is acted on by the stop-screw *w*, and the wheel R' is relieved, which now moves through a small angle under the action of the inflected spring *f*.

On the return motion of the pendulum, the part *a* moves free of the adjacent pin of the wheel R, but makes contact with the pin *z* and propelling the detainer *s* relieves the wheel R, by which the adjacent pin to *a* moves over the impulse or driving plane on *a*, by which the rotary energy of the remontoir spring is transmitted to the pendulum.

Again, on the first reversion of the pendulum motion, the detainer *t* is brought to rest, and with it the escape wheels R and R'; hence the pendulum makes contact with the pin-wheel once every second oscillation, and thus the frictional rest of the ordinary pin-wheel action is avoided.

The displacement of the detainers *s* and *t* is effected without any disturbing influence on the oscillations of the pendulum.

According to the statement of the inventor, who has extensively applied this arrangement, it has given very satisfactory results.

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The Clock at the Law Courts.

After considerable delay, and not until many difficulties had been surmounted, the clock at the Royal Palace of Justice, Strand, was formally set going on the 18th ulto. At the invitation of Messrs. Gillett and Co., of Croydon, who have constructed and erected the clock and bells, a party of gentlemen were present at the ceremony, which was, however, of a most simple character. The visitors first assembled in a spacious apartment in the turret at the eastern end of the building, in which the works of the clock are situated, and where the principal of the firm, Mr. Gillett, gave an interesting description of the mechanism. From this it was gathered that the frame of the clock is of solid cast-iron, and measures 8ft. long by 3ft. 6in. deep. All the wheels are of solid gun-metal, turned, cut, and polished by machinery, and an idea of the powerful nature of the clock may be gained from the statement that the larger wheels measure 24in. in diameter. The escapement is of the kind technically known as the "double-three-legged gravity," and the pendulum is composed of zinc and iron tubes in such a manner that it will not be affected by variations in the temperature of the weather. The "bob," or weight at the end of the rod, weighs 3cwt., and the pendulum, which is 15ft. in length, beats two seconds of time at each beat. By what is known as the patent *remontoir* arrangement, the hands of the clock jump forward every thirty seconds, instead of moving continuously. The dials, which are 8ft. 6in. in diameter, are marked with half-minutes, to give effect to this arrangement, and are made all in one piece, so that small portions cannot drop out. The bells, which are five in number, and amount in weight to 8 tons 4 cwt. 2 qrs. 18 lb., are hung on massive oak beams on a level with the clock dials, whilst the works of the clock are situated in a chamber below. The weights are attached to chains, and are enclosed in wooden cases, which run down through the various floors of the tower to the ground below, a distance of between 80ft. and 90ft. It had been expected that Mr. Street, the architect to the Palace of Justice, would set the clock in motion, but in his absence the string which confined the pendulum was cut by Mr. Gandry, Mr. Street's principal assistant. The clock at once began to go, and continued to perform with the greatest exactness. It was stated by Mr. Gillett that his firm had constructed the clock at the Town-hall, Manchester, which during the last six months had not varied as many seconds. At a luncheon which followed, Mr. Gillett, in responding to the toast of his firm, expressed the opinion that the clock was the most perfect ever constructed, and that it would last for centuries. In the evening, when the clock was illuminated with gas, the time was clearly discernible from a considerable distance, whilst general approval was expressed of the melodious character of the chimes, which are the same as those of St. Mary, of Cambridge.

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A large turret clock has been erected in Inverkeithing by Messrs. H. and R. Millar, Castle Bank Works, Edinburgh. It has four illuminated cast-iron skeleton dials, six feet in diameter, glazed with white opal glass, and fitted with an automatic lighting machine, and strikes the hours and quarters.

The Manufacture of Repeating Watches.

(From the *Journal Suisse d'Horlogerie.*)

(*Continued from page* 69.)

THE "overswinging" of the lifting of the hours should be verified, the quarter-piece being pushed right up, and in making the hours strike without the quarters, it is necessary to examine if the pin of this lifting touches the quarter-piece. When this defect exists, if the lifting overswings more than is necessary for the passage of the twelve-toothed ratchet, the part can be filed where the pin touches the quarter-piece; otherwise, the diameter of the quarter-snail should be reduced as much as it can be done with safety, to prevent the contact of the lifting of the large hammer with the tooth of the quarter-piece.

In striking one hour and three quarters, the finger which brings back ought to be unlocked in such a manner as to permit the quarter-piece to fall to the bottom of the snail.

The examiner may be called upon to increase the lifting of the hour hammer, when the equalisation of the hours has already been done. To avoid hammering the tooth of the lifting of the hours, it is possible to close it, after having tempered it, by putting an arbor in the hole and striking it on the side, in order that it may be brought nearer lengthwise to the part which acts against the pin of the hammer; this plan is very efficacious and produces much effect, without deranging the striking of the hours, the lifting, or pallet not being lengthened.

In order to obtain harmony, it is sometimes necessary to increase the lifting of the hammers for striking the quarters. Do any means exist for doing it without hammering the teeth of the quarter-piece?

If it were possible to close the liftings by hammering the part which acts against the pins of the hammers, it would be easy to obtain the desired effect, but this procedure is not always practicable, for the part to hammer is often very weak.

To surmount the difficulty, the points of the teeth of the quarter-piece in the centre of the movement should be stretched, by fixing the piece in two tongs, the one placed by the pipe, and the other on the three teeth acting on the large, or on the small hammer, that it is necessary to stretch; the steel included between the two tongs should be heated until it changes colour, in the meantime exercising a horizontal pressure with the tongs. It is only necessary to stretch the points of the teeth a very little to considerably increase the lifting; in heating to a violet the effect should be obtained. This method requires care to be taken not to twist the quarter-piece; if this happens, it can be easily set square on a piece of lead.*

These operations will be terminated by the examination of the star, and of the snail or the quarters or five minutes In the first place it should be verified if the division of the plate is exact, and a hand should be placed on the cannon pinion, or the end of the set arbor, so that the differences of the jumping of the star before or behind sixteen minutes may be divided. When the teeth are sharp at the points, a burr will sometimes partly correct the differences; they should be made correct at the last by being bent at the ends, at the part where the pallet or *bouton* of the "surprise" does not touch them; if the ends of the teeth are thick, those which jump too late should be filed on the side opposite to the way of the rotation of the star, without touching the part with which the pallet of the surprise gears.

The hand should afterwards be placed in agreement with that notch of the quarter snail which is the most distant comparatively to the others, in such a manner that the quarter, or five minutes piece, falls just at the moment where the hand arrives on the point of the division corresponding to this notch. Note should be taken of the differences shown by the hand on each of the notches, in like manner as that of the jumping of the star with the sixteen minutes' point, and the notches should be equalised from the one that is the deepest. Before finishing this operation it will be well to make sure that the arm of the quarter, or five minutes' piece, is filed very squarely, and disengaged from the side where it escapes from the corner of the notch to fall on the following quarter.

Afterwards, the jumping of the star should be put in agreement with the quarters, or five minutes, in the case where it should jump too soon; the passage behind the "surprise" should be increased by filing the opening where the pin passes which is fixed in the snail. If, on the contrary, it jumps too late, the point of the jumping of the star should be put out of the centre in the opposite way to its movement of rotation.

After the "jumping" on the hour has been put in agreement with the quarters or five minutes, the snail should be removed, the "surprise" being placed behind against the pin, so that when the quarter, or five minutes piece has fallen on the three quarters, or on the eleventh notch of the five minutes snail, the hand placed on the cannon pinion can nearly pass the sixteen minutes point, in making it pass until the snail touches the arm of the quarter or five minutes piece resting on the snail.

After the adjustment of the star and of the snail are finished, the forward play of the "surprise" should be sufficiently increased, so that at the same moment that the jumping of the star is just going to take place the pallet may be disengaged from the pressure of the tooth which it has pushed forward.

If the concentric part of the surprise was not prolonged below the snail, so as to allow the forward play to be increased, without having an interruption between the snail and the surprise, the back of the pallet where the star touches immediately after the jumping should be filed, without however diminishing the breadth of the pallet too much at the points where it gears with the star to make it jump backwards and forwards.

For minute pieces the same course should be adopted, by taking for the starting point of the examination the first notch of the minute snail corresponding to one minute. After having carefully verified the divisions of the dial, the hand should be placed exactly in agreement with the first division after each quarter, and after the jumping of the twelve teeth of the star has been separately equalised by the points, and that of the four quarters by the *talons* of the surprise, the jumping of the star and that of the surprise will be put in agreement on the hour, and on the quarters with the first minute by their two pieces (*sautoirs*). It should be equally ascertained that the hand passes the points of the four quarters, when the cannon pinion is turned forward, the minute piece resting on fourteen minutes.

If the hand does not pass the point at the moment when one of the four arms of the minute snail is just stopping against that of the minute piece, the examiner should file as much as possible before each of the arms of the snail, and the part of the arm of the minute piece with which it is in contact, well concentric to its centre of movement.

It may, perhaps, happen that the screwed stud on which the quarter and minute pieces act, has been placed by the repeating maker in such a position, that even in filing as much as possible the arm of the minute snail and that of the minute piece, the watch stops at the moment that the jumping of the surprise is going to take place, and when the hand is going to reach the point on each of the quarters, the snail being just resting against the arm of the minute piece before it is entirely brought back by the train. In this case the piece must be struck rapidly and made to jump on the four quarters, a fifteenth of a minute before the points.

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* We do not hold ourselves responsible for any accidents that may arise in attempting to carry out these directions.—Ed.

When the hour is struck at the moment that the star is going to jump, the arm of the quarter piece which falls on the three-quarter notch ought not to touch before the quarter snail, and when it is struck immediately after the jumping of the star, the snail, which is advanced before the surprise on which it is fixed, ought to pass the width of the arm which is resting on the high part corresponding to the *zero* quarter.

On each quarter, in making it strike at the instant where the surprise is going to jump, the arm of the quarter piece ought, in falling on the snail, to rest its full width on the edge of each of the notches, and immediately after the jumping, the arm being narrower than the space passed over by the "surprise," will fall on the following notch without touching against the preceding one.

(*To be continued.*)

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AMERICAN WATCHES.

TO THE EDITOR OF THE "WATCHMAKER, JEWELLER, AND SILVERSMITH."

Waltham Buildings, Holborn Circus.
London, December 10th, 1883.

Sir,—The title of the "American Watch Co.," is a Trade Mark, and their right to that exclusive term is fully protected by law; this, together with the fact that other American Companies are known in this country chiefly by their incorporate names rather than by their productions, justifies our contention of the 9th ult., that when American watches are named, the title refers either to *our* goods, or the bogus article.

If with *your* experience you are candid enough to admit your acquaintance with American watches has been very limited, we must infer that correspondents who criticise so keenly, know little or nothing of them, in fact it is our belief they are led astray by names transatlantic in sound, but as baseless in foundation as the quality of the goods they stamp is rotten.

Very truly yours,
Robbins and Appleton.

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Queries and Replies.

A Correspondent writes:—"Could you kindly inform me the proper stamp for 22 carat wedding rings, and how long since they were last stamped with the lion?"—Through the kindness of the chief of the London Assay office, we are enabled to give the following information: Wedding rings of 22 carat standard gold are stamped with the "Queen's Head, Letters, Crown, 22, Leopard." It is thirty-nine years since they were last stamped with the lion.

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Arrangements for the rating of watches at the Kew Observatory are actively in progress. As a preliminary, the staff are being trained for their new duties. We are promised a copy of the regulations as soon as they shall have been approved of by the committee, and will publish them at the first opportunity. For the present, therefore, we will content ourselves by wishing success to the proposed operations, and offer all the co-operation in our power, both editorially and personally.

American Trade Mark Suits.

Injunctions in favour of the William Rogers Silver Plate Manufacturing Company.

Judge Arnold of the Court of Common Pleas, No. 4, for the county of Philadelphia, filed his opinion July 21st, granting an injunction in favour of the William Rogers Manufacturing Company, of Hartford, against the Rogers Manufacturing Company, incorporated under the laws of Pennsylvania, April 20th, 1883, restraining them from using the trade marks of the Hartford firm. This is the fourth injunction which has been granted by the courts in favour of the Hartford firm during the past year and a half. The first opinion was delivered by Judge Lowell, of the Circuit Court of the United States for the district of Massachusetts, and was delivered April 12th, 1882. It enjoined the Rogers & Spurr Manufacturing Company of Greenfield, Mass., from using the name of Rogers in the manufacture of silver-plated goods, and sustained in strong and conclusive terms the right of the Hartford firm to the use of its trade marks. The second suit was against R. Strickland & Co., of Albany, N. Y. This firm had secured a young man named Rogers, from Staten Island, and had made him president of the organization. With this move they commenced the manufacture of silver-plated goods, imitating the trade mark of the William Rogers Manufacturing Company, and placing a counterfeit article on the market. Suit was brought against them and resulted in the granting of a permanent injunction. The third suit was against the Rogers & Britten Silver Company, of Bridgeport, and also resulted in the granting of a permanent injunction.

THE PHILADELPHIA SUIT.

The injunction which has just been granted by Judge Arnold restrains the Rogers Manufacturing Company, which was organized under the laws of Pennsylvania, from infringing the name or trade marks of the Hartford Company. The defendent corporation was organized by George Rogers, an attorney who subscribed for 200 shares and became president of the concern. George Linsenmayer, a silversmith, also took 200 shares. A brother of Linsenmayer, John Linsenmayer by name, subscribed for ninety shares, and two other persons received five shares each, making the entire capital 500 shares of the par value of 10 dols. per share. As soon as it was learned that the new firm was going into the manufacture of silver-plated ware, a close watch was set, and the first dozen spoons which they sent out bearing the "Rogers" trade mark was obtained by the William Rogers Manufacturing Company. The silver was stripped from the spoons and was used as evidence against the defendant in the suit.

THE USE OF A NAME.

In his opinion, Judge Arnold remarks: "The plaintiff complains that the use of the name Rogers by the defendant is a mere imitation, calculated to deceive and mislead purchasers and consumers of like goods manufactured and sold by the plaintiff, to the disadvantage of the plaintiff, and seeks to restrain the defendant from the use of any stamp embracing the word Rogers, in any manner, upon silver plated goods. The record raises the question how far a man may stamp his own name on goods manufactured by him, and under what circumstances such use of his own name will be restrained. The subject has received consideration in many cases, and the result of them all may be summed up as follows: That every man has a right to use his own name in connection with the articles he manufactures or sells, provided he does not so use it with intent, and in such a way, as to deceive or defraud the public, or obtain for himself, at the expense of another, any undue advantage. But if the use of the name is intended to gain an advantage over anyone already established, and using it in the same trade, or if, without such intent, the effect is to mislead and deceive buyers, then such use of the name will be prevented by injunction; and while all intendments are made in favour of a person formerly in the trade, when he sets up a new firm, yet the presumptions are against a stranger to the business, when he sets up a rival establishment. In support of this position Judge Arnold cites a number of cases including Lewis *v.* Langdon, Halloway *v.* Halloway, Taylor *v.* Taylor, Clark *v.* Clark, Stonebraker *v.* Stonebrake, (33 Maryland), Holmes, Booth & Haydens *v.* Holmes, Booth & Atwood Manufacturing Company (37 Connecticut), James *v.* James, McLean *v.* Fleming (96 United States Reports), Burgess *v.* Burgess Comstock *v.* Woite, Faber *v.* Faber, Hardy *v.* Cutter, (3 United States Patent Gazette), Meneely *v.* Meneely, (62 New York), Gilman *v.* Hunnewell (122 Massachusetts), and the celebrated French case, Moet & Chandon *v.* Moet & Co. The original Moet of Epernay, represented now by Moet & Chandon, had acquired for more than a century a deserved reputation for their champagne. In 1872 a company, in which M. Jean Frederic Moet appeared as an only copartner, was created at Rheims. Moet was an accountant of a brewer, associated with himself a number of silent partners to manufacture and sell wine under the name of Moet & Co. The Tribunal of Paris, the highest court in France, enjoined the use of the name, being of the opinion that Moet, who was entirely unconnected with this branch of the trade up to that time, had been called into the new firm only because of the similarity of his name to that of the firm already existing. This judgment has stood the tests of French law. Judge Arnold holds that the Philadelphia firm were striving to obtain the use of a name which had a value in trade for the purpose of using it for their own benefit, and for the purpose of gaining an advantage over persons who are legally entitled to it. In this view of the case, sustained by the opinion of Judge Lowell, he granted the injunction asked for by the William Rogers Manufacturing Company of Hartford. The case was in court only about three months. The opinion gives additional strength and prominence to the Hartford Company, which has successfully established its right to the use of the word "Rogers," and the exclusive use of its trade marks on silver-plated goods.—*Chicago Watchmaker and Metalworker.*

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Luminous Jewels.—M. Gaston Trouvé, the well-known electrician of Paris, has lately designed a series of ornaments for ladies' wear, which consist of glass, coloured and cut to imitate rubies, diamonds, &c., fitted in an envelope surrounding a small incandescent lamp of low resistance. The light shines through the pieces of glass only, and gives them all the appearance of the stone they are intended to imitate. The lamp is fed from a small battery, which is carried about the person. It is composed of three pairs of zinc-carbon plates (two carbons to each zinc), or a larger number according to the current required. These plates dip in a saturated solution of bichromate of potash, which is contained by an ebonite cell with three compartments. The plates are fitted into a cover, which is kept securely down on the top of the cell by two bands of india rubber passed round the whole. Finally the battery is encased in two sheets of gutta percha, so as to entirely prevent any leakage. A miniature switch is carried in the pocket or elsewhere within reach, to which the battery and lamp wires are connected. The pressure of a finger on the arm of this switch makes or breaks communication with the lamp. The battery weighs (with six plates) 300 grammes, and will work about 30 minutes with a two or three-volt lamp. A larger battery to work a four or eight-volt lamp weighs 800 grammes.—*Electrician.*

City and Guilds Institute.*

Professor Huxley, the President of the Royal Society, distributed the prizes to the Metropolitan students whose training has been directed by the City and Guilds of London Institute, on the evening of the 10th ult. in Clothworkers' Hall. This historic building was crowded. The Lord Mayor presided, and was supported by Mr. Sheriff Clarence Smith Mr. Sheriff Cowan, Mr. C. J. Orton (Master of the Clothworkers' Company), Alderman Sir J. Whittaker Ellis, Sir Frederick Bramwell (Chairman of the Executive), Mr. H. Woodall, M.P., Mr. E. Lyulph Stanley, M.P., Mr. G. Shaw, Mr. Mark Wilks, and many gentlemen associated with the subject of technical education. In welcoming to the City the President of the Royal Society, the Lord Mayor described him as the head of the intellectual life of the empire. Mr. W. P. Sawyer, one of the hon. secs., gave some particulars of the progress of the Finsbury Technical College, which at the present time has one hundred students attending the day classes, most of whom where taking a completion of study, and 531 in attendance in the evening. Mr. Owen Roberts, M.A. (Clerk to the Clothworkers' Company, and Hon. Secretary to the Institute), added an account of the work at the South London School of Technical Art, with which he is immediately associated. The number of students had increased by over thirty during the past year, and more than 110 were now receiving instruction. The value of the training received was testified by the fact that many of the former lady pupils were now earning an honourable livelihood. Of the technological examinations Mr. Owen Roberts also gave some interesting particulars in illustration of the rapid advance of the students, and said that whilst this department of the work had already fully realised their expectations, in another decade the results would surprise them all. Professor Huxley was assisted in the distribution of the prizes by Mr. Philip Magnus, the director and secretary of the institute, and the recipients, many of whom were ladies, were heartily cheered by their fellow-students, some 300 of whom were present. After the ceremony Professor Huxley addressed the assembly in conversational style, having, he said, by the hard work of last month been prevented from preparing an adress. He recalled the announcement made by him in 1877 to the Working Men's Club and Institute Union of the contemplated initiation of the technical instruction movement. In the short space of six years how profoundly satisfactorily had the plans of that time been carried out. The scheme of technological examinations in the different parts of the country now embraced nearly three thousand examiners, having increased twelvefold. Six years ago there was in this great city nothing that could be called an efficient technical school, either in the direction of science or art. The Finsbury Technical College, which he had recently visited, surprised as much as pleased him by the luxury of appliances with which it was provided, and by the signs of zeal and activity on the part of teachers and taught which met him at every turn. For the particular purposes for which its teaching was intended, and in regard to the particular classes which it adressed, he had not previously met with anything that struck him as so thoroughly good as the method of instruction adopted at that institution. Harvey had pointed out, as the rule which was the root of all successful teaching in physical science, that those who in studying anatomy failed to obtain by means of their senses and observations an exact knowledge of the objects with which they were concerned filled themselves simply with inane fancies and empty imaginations. That sentence of Harvey's would certainly be the most appropriate motto for the physical and chemical laboratories in Finsbury College. He mentioned that a part of the hard work he had referred to had been to assist in making a soul for the bricks and stones of the Central Institute at Kensington. He was perfectly sure that they had in the system of technological examination, and in such institutions as those at Finsbury, Kennington, and Kensington, something which would most inevitably be the nucleus of a vast growth of similar organisations. Before this generation had passed away the centres of examination would be counted by hundreds, and instead of the two or three high-class places of technical instruction which had been enumerated, they would be numbered in different parts of this island by the score, and that they would have in the Central Institute the great uniting point for the whole of this network through which the information and the discipline which was needful for carrying the industries of the country into operation would be distributed into every locality in which such industries were carried on. Professor Huxley dwelt upon the important function which these institutions rendered in satisfying the intellectual hunger of the people, and enabling every man to take the place for which he was fitted, but from which he might be debarred by the accidents of life, and the organisation of society. In conclusion, he specially emphasised the need for training and discipline, because of the rivalry of that people across the Atlantic, who were of the same stock, blood, race, and power, and would run us harder than any competitors had hitherto done. His closing words contained an assurance of the special pleasure he had in being present, because of the old associations of the City with the Royal Society; for Gresham College, the present abode of the City and Guilds of London Institute, was the old meeting-place of its members. To this the Lord Mayor added the remark that two centuries ago the offices of the President of the Royal Society and the Master of the Clothworkers' Society were united in the person of Samuel Pepys, who occupied both. Sir Francis Bramwell, Sir Frederick Abel, F.R.S., the newly-elected Chairman of the Council of the Society of Arts, Mr. Woodall, M.P., and the Master of the Mercers' company, submitted the adoption of the complimentary resolutions that followed, and which included votes of thanks to Professor Huxley, the Lord Mayor, and the Clothworkers' Company, who, in addition to granting the use of the hall, subsequently hospitably provided for the large assembly.—*The Citizen.*

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* The particulars connected with the Watch and Clock Making Examination were given in our September number.—Ed.

SPOONS AND FORKS AND 18-CARAT (HALL-MARKED) CHAINS.

TO THE EDITOR OF THE "WATCHMAKER, JEWELLER, AND SILVERSMITH."

Sir,—The gold chain trade has now come down to the level of spoons and forks, and we find chains sold retail, exposed in shop windows, at £4 per ounce. Tea and coffee services, it is said, are soon to follow suit. Shortly there will not be a living profit on the manufacture or sale of any article in the trade. Meanwhile, workmen's wages get lower and lower. I do not know whether it has occurred to your readers that the "hall-mark" is at the bottom of this mischief. The "hall-mark" guarantees the material, not of course the workmanship, and therefore it matters but little how an article may be finished, it goes down with the public if it be but cheap; but of course, the system must drive capital out of the trade, as indeed has been proved, unhappily, during the last few months in the case of the silver trade.

My experience of business during the last few years leads me seriously to think of transferring my capital to more remunerative employment than that of making 18-carat (hall-marked) chains. I would wish to see the hall-mark done away with, and to depend upon my trade mark.

Yours, &c.,
A Gold Chain-maker.

An Electric Signal Clock.

The Committee of the Electrical Section of the Franklin Institute of the State of Pennsylvania to which was referred for examination Blodgett Bros., of Boston, Electric Signal Clock, report that they have examined the invention, and find its purpose and construction substantially to be as follows:—

The instrument is designed—(1st.) To give any kind of fixed signals at any regular or irregular intervals; and especially (2nd.) To cause the striking of warning and departure signals for railway trains or street cars, according to the time table in use. In general, it is intended for all purposes where any sort of time signals is required.

In the following, we give the peculiar features and manner of operation of the instrument.

An electro-magnet is connected by wires to a standard clock which closes an electric circuit once every minute. This magnet, by means of a lever and a pawl, rotates a ratchet-wheel of sixty teeth one step each minute. The wheel is rigidly attached to the axis of a vertical cylinder fourteen inches high, and six inches in diameter, which revolves with it, and therefore makes a complete revolution once in an hour. The cylinder has two divisions, each of which is provided with a hole for every minute of twenty-four hours, or 1,440 holes in all, arranged in a single spiral.

A toothed wheel on the axis of this cylinder, gearing into another of equal size, imparts its motion to a coarse-threaded screw, which raises, at a rate uniform with the movement of the cylinder, a small sleeve or follower, consisting of a short lever with two arms, the forward end of which passes very near to the surface of the cylinder. The rear end of this lever is forked, and gives a lateral movement to an elongated crank, and also, by means presently to be described, to a vertical rocking shaft, bearing at its upper end a horizontal bar, adapted alternately to engage with and release stop pins of a circuit wheel.

Whenever the vertical shaft is slightly rotated, the circuit wheel (which is driven by a spring clock movement) is released, and moves on a short distance.

For railroad purposes, two signals are usually required for every train; a warning or preliminary signal, which precedes the other by an interval of from two to five minutes, and a final or departure signal, sounded at the exact moment when the train should start. To effect this operation, short pins are inserted into the holes of the cylinder, which correspond in location to the times of all the warning and departure signals. The lower division is arranged according to the week-day time-table, and the upper one according to the Sunday time-table. The follower passes over every hole in the cylinder once in twenty-four hours. When in the course of its traverse, it comes in contact with the first of the two pins for any train, the end is moved away from the cylinder a short distance, and by a small rotation of the vertical shaft, deflects the horizontal bar far enough to allow a pin to pass, and thereby set the circuit wheel of the clockwork in motion. This wheel has upon its circumference a series of projections or pins, which, when the wheel revolves, come in contact with a fixed spring. The projections and spring close an electric circuit through the signal bells a certain number of times, depending on the signal to be given. When the follower comes in contact with the pin denoting the time of the second or departure signal, the operation is repeated, except that there are a different number of projections on the circuit wheel, and so a different number of strokes upon the bells, corresponding to the distinctive character of the final signal. When the time of the next train approaches, the same movements are repeated, and so on through the entire day. At midnight the follower has completed its traverse of all the holes in the cylinder, and it is then automatically detached from the screw by a cam, and falls freely to its position opposite the first hole in the series, where it becomes again attached to the screw, and begins a new day.

A second follower, also connected with the elongated crank, moves in like manner over the upper part of the cylinder; but it cannot put in motion the striking mechanism during a week-day. On Sunday, however, it is rendered operative, and the lower one inoperative, in the following manner: Each of the elongated cranks, before described, is attached to a sleeve, fitting loosely on the rod, carrying the horizontal detent bar. It communicates its motion to this rod by means of a slot in the sleeve, engaging with a pin, running transversely through the middle of the rod, in such a manner that a slight movement downward of both sleeves, will disengage the lower one from the rod, and the pin will engage with a slot in the upper sleeve, which can then rotate the rod and detent bar, against which the stop-pins rest; while now the lower one turns freely about the rod, without affecting the mechanism in any way.

The weight of the sleeves is carried by a cam attached to a ratchet wheel of seven teeth, which revolves round the vertical rod. In the descent of the follower at midnight of each day, it moves this seven-toothed ratchet wheel and cam forward one space.

One-seventh of the circumference of the cam is depressed considerably below the level of the remainder, which is horizontal. The sleeves are supported by a pin, which during six days of the week rides upon the horizontal surface of the cam; but at midnight, Saturday, it falls into the depression, lowering the sleeves and thereby disconnects the lower one from the vertical rod and bar, which control the striking mechanism, and engages the upper one. For this day, then, the pins in the upper division corresponding to the Sunday time-table, operate the signal bells, and those for the week-days have no effect. With the next transfer of the follower, at midnight, Sunday, the pin is lifted out of the depression of the cam, and the week-day time-table is resumed.

These operations are repeated week after week, requiring no other attention than the winding of the spring of the clock movement which drives the circuit wheel, once a week, or at longer intervals, according to the number of trains.

There are some peculiar features to be noticed about this machine. Instead of the usual arrangement of a stationary magnet and a movable armature, the magnet which rotates the cylinder is pivoted on a vertical axis near the base of the coils of the magnet (which are in a vertical plane), and the armature is stationary. Both have curved surfaces, which are arranged eccentrically to each other, in such a manner that the movement of the magnet, when the current passes, brings it constantly nearer to, but never in contact with the armature. Its path is limited by a stop. When the electric circuit through the coils of the magnet is broken, a repelling spring returns it to its first position. The cylinder is prevented from moving backward by a fixed pawl engaging with the teeth of the ratchet wheel; and from going more than one space at a time, by a wedge-shaped projection on the pawl which rotates the cylinder, coming in contact with a stop at each movement, and preventing further motion of the wheel.

The operation of changing the time-table for a new schedule, consists simply in removing the pins, which are screwed into the cylinder, and placing them in new holes. The holes are numbered for every five minutes, to facilitate this operation. The number of signal-strokes may also be easily changed for a different number of blows in the series, by simply substituting for the circuit wheel another with a different number of projections. Three or more blows may be given for each train instead of two, by proper arrangement of the projections on the circuit wheel, and corresponding limits of motion by the stop pins.

The instrument has no parts that are easily deranged, nor are its adjustments difficult to be made. The wear is very slight, and the parts are all accessible for repairs, should any such be necessary.

Believing that Blodgett's Electric Signal Clock is not only an invention that will answer the purpose it is designed for, accurately and effectively, but that it also solves some complex mechanical problems simply and ingeniously, we recommend that Blodgett Bros. receive the award of the Scott Legacy Medal and Premium.

Approved, September 5, 1883.

H. R. Heyl,
Chairman Committee Science and the Arts.

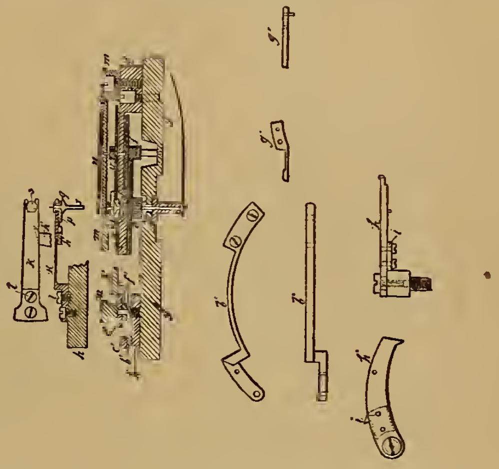
Attest: William H. Wahl,
Secretary.

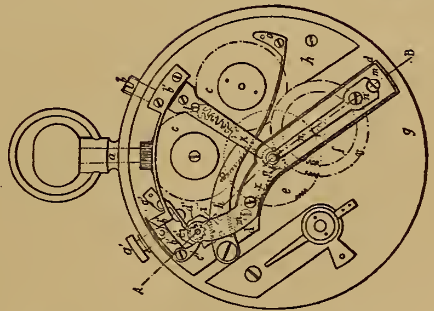
◆

Improvements in Stop Watches.

Patented in this country by Ovide Ferdinand Domon, of Belfort, France.

This invention relates to a special mechanism applicable to watches independently of the watch movement proper, and not requiring increase in the size of the watch.





The chronograph or stop watch represented in the accompanying drawings and hereinafter described has the following peculiar features:—

1. Complete independence of the chronograph or stop mechanism from the rest of the mechanism so as to allow its application to a Lepine watch with or without secrets as well as to hunting watches and not to require a special size of watch; thereby offering great facilities in the construction and principally for repairing.

2. The use of a snail having two inclines and three stops, and which owing to its fine and precise working is far less subject to wear than the mechanism of systems hitherto known.

3. A forked spring provided with a regulating screw.

4. Replacing the intermediate transmitting gear with special teeth by a single gear wheel with ordinary teeth actuating a loose centre pinion, the back lash or loss of time of which is neutralised by means of a light brake-spring.

5. The application of a pair of polished friction-cones adapted to drive the seconds hand (the chronograph hand) which may be instantaneously stopped or set in motion by setting the friction-cones in or out of contact with each other.

In the accompanying drawing the following parts belong to the ordinary mechanism:—

a represents the pendant of the stem-winder provided with a pinion.

b the pusher for setting the hands.

c the crown wheel of the winding apparatus.

d the bridge for the centre wheel.

e the centre wheel and its pinion.

f the third wheel and its pinion.

g the bridge supporting plate.

h the bridge of the spring box.

The following parts belong to the stop mechanism:—

a^1 represents the pusher.

b^1 the large spring of the pusher.

c^1 the spring-pallet.

d^1 the ratchet-wheel with nine teeth.

e^1 the bevelled snail with three cams having two inclines and three stops and actuated by the pin of the ratchet-wheel, as shown.

f^1 stud or pivot for the snail and ratchet-wheel.

g^1 the spring-pallet.

h^1 the large lever set in motion by the snail and actuating the forked spring and the heart-cam.

i small nose of the large lever, which nose can be adjusted for the purpose of regulation and for the compensation of wear.

k forked spring causing the release of the friction-cones.

l set-screw for putting the forked spring at rest.

m large bridge made of steel or nickel.

n bolt or fastening spring causing the adhesion of the friction-cones after the release of the forked spring.

o spring of the large lever.

p heart-cam returned to its starting-point (midday).

q friction-cone of the arbor set-in motion by the contact with the cone of the transmitting pinion.

r arbor actuating the chronograph hand.

s cap or sleeve mounted on the arbor and fitting into the forked spring.

t transmitting pinion provided with a polished friction-cone and sixteen teeth, and without back-lash or loss of time, owing to the effect of the brake-spring.

u bearing or guide-plate fixed by three screws and in which pivots the transmitting pinion. This bearing may be omitted by arranging the transmitting pinion so as to pivot on the prolongation of the pinion of the centre-wheel.

v transmission wheel fixed on the pivot of the third wheel.

x brake-spring.

◆

Trade Notes.

ENGLISH AND AMERICAN SILVER PLATE.—The following paragraph, which we have pleasure in reproducing, appeared in a recent issue of a contemporary. Before undertaking the Editorship of this Journal, we strongly advocated the necessity and advantages of an official system of hall-marking, and nothing has occurred during the last three years to cause us to alter our views. Silversmiths, however, show an unreasonable dread of competition, and desire to be fenced round and protected in every possible way. It is not practicable for foreign plate to be hall-marked here, therefore it is to all intents and purposes excluded from our markets, the "reciprocal" plan, if it could be carried out, ought to satisfy all parties. At the same time, we believe the time-honoured British hall-marks are so much valued by the public, that the American stamp would have no chance against them. This, however, could only be demonstrated by actual experiment, and we see no reason why the silver trade should be the only "protected" industry:—

"According to Mr. King, the American Consul at Birmingham, it appears that many leading manufacturers of silver-ware would not be averse to a reduction or abolition of the duty upon silver-ware in America if they could thereby secure free entrance for their goods into this country. Should this be true, it would seem as if an excellent opportunity was here offered for a trial of the new 'fair trade,' or reciprocal theory of tariffs. If the American Government should establish assaying offices at the chief ports of export, where all goods for sale in England might be tested and stamped, it would be possible to offer to admit all English plate bearing official hall-marks free of duty, on condition that all plate bearing the American stamp should be freely admitted to the United Kingdom. England has already a precedent for this, as she admits guns bearing the Prussian and Belgian marks, while none others can be sold here without being tested and stamped at a British proof-house." *British Colonial World.*

THE Goldsmiths' Company have munificently given a donation of £500 towards defraying the expenses of enlarging the building of the British Horological Institute, in order that a larger number of practical students may be received. The work is supposed to be thrown open to public competition, and if any of our readers have relatives or friends in the building trade, we should advise them to apply to the secretary of the institute for the needful particulars.

NOTES FROM J. HERRMANN'S LECTURES ON "WATCH AND CLOCKMAKING."—Mr. Herrmann writes that the diagram which appeared in our last issue, and which our engraver faithfully reproduced from the sketch, is incomplete. To correspond with the explanations, the following should have been added at the left of the diagram, "P. Sine P C B." Also "momentum" was wrongly substituted for "moment." It is only due to Mr. Herrmann to state that owing to a delay in obtaining the block, a proof could not be submitted to him.

◆

Index to Antique Rings and Ornaments.

109.—An Egyptian ring, consisting of small beads of coral and thin plates of gold cutter representing the leaves of a plant.

110.—A curious ring with a double keeper, as worn by Egyptian men. The lowermost keeper, of twisted wire, is put on the finger, then follows the ring, the second keeper is then brought down upon it, the two being held by a brace which passes at the back of the ring, and gives security to the whole.

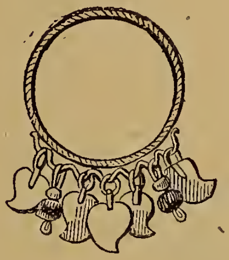
111 to 113.—Fig. 111 is also of the Londesboro' collection. It is of silver, and has a large circular face composed of a cluster of small bosses, set with five circular turquoises and four rubies, the centre being a turquoise with a ruby and turquoise alternating round it. Fig. 112, also of silver, and set with an octangular blood-stone with a circular turquoise on each side. Fig. 113 is a signet ring bearing the name of the original owner engraved on a carnelian.

114.—Represents a curious ring forming part of the Londesboro' collection. The outside of the hoop is plain, and is set with a ruby and amethyst. Upon pressing the stone the ring opens by means of a spring, and the surface is covered with magical signs and names of Spirits.

115.—The famous "Fisherman's ring" of the Pope. It is a signet ring of steel, used for the briefs issued from the Romish Court.

Supplement to the "Watchmaker, Jeweller, and Silversmith," January, 1884.

ANTIQUE RINGS AND ORNAMENTS.



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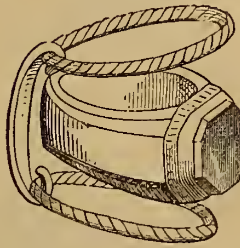

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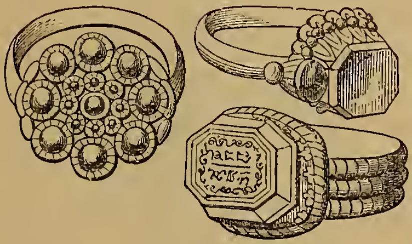
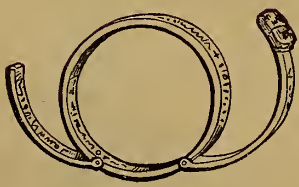


111, 112 & 113.



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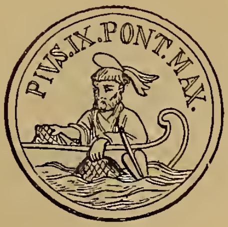
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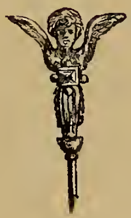
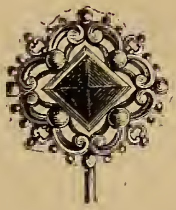
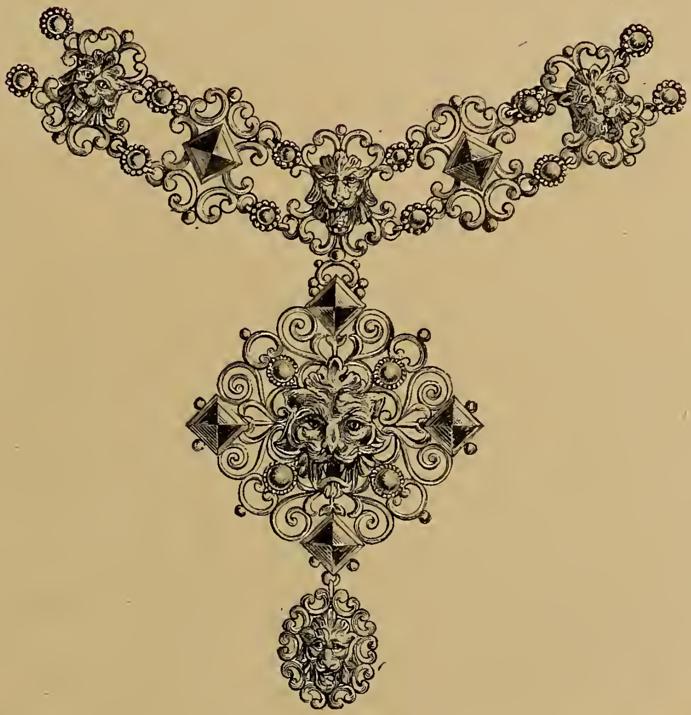
For Description, see page 106.

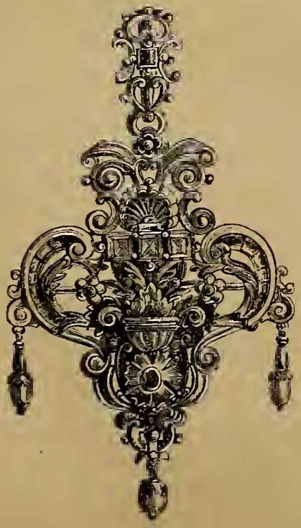
Supplement to the Watchmaker, Jeweller, and Silversmith, January 1st, 1884.

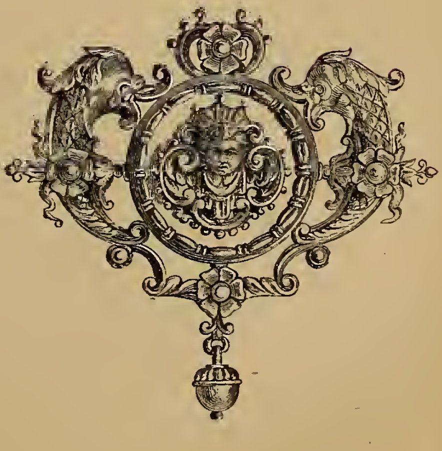
MONTHLY SUPPLEMENT OF DESIGNS.











THE WATCHMAKER JEWELLER AND SILVERSMITH

EDITED BY JAMES U. POOLE.

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ILLUSTRATED SUPPLEMENT:—"Design for Clock and Brooches."

The British Horological Institute.

We publish in another column an abstract of the proceedings at the last half-yearly General Meeting of members, although the latter, as usual, seemed perfectly content to leave their interests in the hands of the working members of the Council.

It was officially announced by the chairman, that Mr. John Jones, who may be termed the Father of the Institute, had felt it necessary, in consequence of failing health and the pressure of other engagements, to sever his active and business connection with the council, although he had been induced to consent to allow his name to remain as vice-president. We wish, under the circumstances, that an additional vice-president could be elected. The last vacancy, occasioned by the resignation of Mr. Jackson, was filled up by Mr. Chapman, F.R.G.S., the official representative of the City and Guilds Institute, and it was felt by the council that this gentleman would confer an honour on the Institute by accepting the position of a vice-president. His influence has lately been successfully exerted in obtaining the grant of £500 from the Goldsmiths' Company towards the expenses of enlarging the building. Mr. Chapman is, however, not a practical horologist, and it therefore seems advisable that a gentleman should be elected who would take an active part in the management of the practical work of the Institute conjointly with Mr. Glasgow. We hold that a responsibility is attached to the holding of the office of vice-president, and that it is something more than a mere distinction. The question of the alterations of the building will be occupying the anxious attention of the council for some time to come. When they are completed we shall strongly advocate the appointment of assistant teachers, so that the benefits of the funds so generously granted by the City and Guilds' Institute may be more distributed.

Before closing this article we would refer to some remarks made by Mr. Ganney, who, according to custom, relieved the monotony of the proceedings by one of his characteristic speeches. He has an *idée fixe* that practical manufacturers should combine with capitalists, who he believes are anxiously waiting an opportunity to largely invest money in the watch trade, and so bring their names prominently before the public, to whom they, or we, are all but unknown. We feel that we have some right to deal with this subject, and unhesitatingly say that, as a general principle, Mr. Ganney's idea is fallacious. It might answer in one or two cases; but the effect of the wholesale advertising he speaks of would be to place practical men on exactly the same footing as the present prominent retailers, the display of whose names is so objectionable to him. A genuine lover of fine work must necessarily keep his business within the limits of his own personal capacity of controlling it, otherwise he would feel no confidence in what he was selling. We dealt with another phase of this subject in our first contribution to this journal, in July, 1880. Retailers, however, frequently behave in a very uncompromising way to manufacturers; and points of scientific and practical detail, such as Mr. Kullberg, or the late Mr. Cole, to whom Mr. Ganney referred, would delight in dwelling upon, do not receive the attention that they deserve. One object of the Horological Institute is to foster an appreciation of good work, and we hope that it will be successful in doing so.

Secrets of the Watch and Jewellery Trades.

We select the following letters from a lengthened correspondence which has appeared on the above subject in the *Standard*:—

To the Editor of "The Standard."

Sir,—Referring to your correspondence on the so-called secrets of the plate, jewellery, and watch trade, the frauds alluded to have been caused by the demand there has been for secondhand and antique goods (and we understand this extends largely to other businesses.)

Notwithstanding the exposures that from time to time take place, the demand continues to exist, the consequence being that some dealers do a large and very remunerative business in spurious articles, as it impossible to meet this demand with genuine goods. We venture to state that not one article in a thousand of so-called antiques is really genuine.

As regards the watch trade, there is, unfortunately a just cause of complaint—namely, the placing of foreign movements in English Hall-marked cases, and the selling of them as English work throughout, which has almost ruined the English Watch Trade—once an important industry.

This is a subject we think the English watchmakers should endeavour to remedy, and by an alteration in the law of Hall-marking, disallow foreign-made goods to receive a false certificate, thereby ruining the home manufacture and deceiving the public.

As to the frauds in gems, the penalty ought to be as severe against the offenders as it is against makers of spurious coinage, which might stamp out the disgraceful fraud of selling counterfeit for real.

We are, Sir, your obedient Servants,
Manufacturing Goldsmiths and Silversmiths' Company.

112, Regent Street, London, W.,
January 18th.

To the Editor of "The Standard."

Sir,—We note the letter from the Manufacturing Goldsmiths' and Silversmiths' Company, in the *Standard* of to-day, and, as old-established and practical manufacturers, can fully endorse their statements as to the injury done to the legitimate English Watch Trade by the present unfair use made by foreign makers of the British Hall marks, which have become, by long usage, trade marks of great value.

Unfortunately, so many English dealers and retailers have given their support to the system, mainly on account of the increased profit they are enabled to make, that united action on the part of the trade is not to be expected, and the remedy rather rests with the public themselves, who should insist on really having what they imagine they are purchasing, viz., *bonâ-fide* English work.

The Custom House officials have recently declared the importation of watches with our Hall marks on the cases unlawful; but either large quantities must be systematically smuggled, or the examination is not properly conducted.

Furthermore, any person may register his initials at Goldsmiths' Hall, and act as an agent for a foreign maker. Unfinished cases are sent from abroad, assayed and marked by means of the aforesaid agent, and then returned for completion. Not only do English watch manufacturers have to compete against cheaply-made cases, but the entire works are foreign also, so that the only English parts in the great majority of medium-priced watches purchased at the present time by the public are the names and Hall marks.

We are, Sir, your obedient Servants,
James Poole & Co.

33, Spencer Street, Clerkenwell,
January 19th.

To the Editor of "The Standard."

Sir,—I have read with much pleasure and interest the correspondence in your columns on the above trades, and, as a watchmaker and jeweller of thirty-four years' standing, I fully endorse all that has been written exposing these "tricks of trade." Independently of all the rascality, which will, I fear, ever be making new departures in those fields of ingenuity which your first correspondent so ably and truthfully described, there is much disappointment in store for the purchasers of those watches that are represented to be, and sold as, of English make, when the cases only are of home manufacture. It would be well, I think, for the public generally to know that in a few years the greater number of those watches will be absolutely worthless as timekeepers, and they will, probably, have cost as much for repairs as they did when obtained new. Space could not, I am sure, be found for me to describe the many faults of the wretched things now sold as gold lever watches by respectable firms, who are anything but worthy successors to the mechanics who, in former times, learned from a long apprenticeship the quality of the articles they sold.

It was a point of honour and pride with them that the watches they sold should serve father, son, and grandson, if need be. Only last week I had brought to me, for repairs and cleaning, a gold horizontal watch that had been in wear more than sixty years, and at the same time a modern American lever in English cases. Without exaggerating, I can truthfully say that the former was as perfect as when first sold, with the exception of the seconds pivot; while the latter had already been many times to the watchmaker, from defects in material, construction, and workmanship generally. It was more worn in five years than the other in sixty. I only hope this discussion may lead to some improvements in the trade. Personally, I have no faith in attempts at improvement short of requiring every watchmaker in business to show that he has served a proper apprenticeship.*

I am, Sir, your obedient servant,
E. H. M.

High Street, Berkhamsted,
January 21st.

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* We heartily endorse the writer's opinions on the apprenticeship question.—Ed. W. J. & S.

The Goldsmiths' Company and Indian Silver Plate.

WE extract the following correspondence from a recently issued Parliamentary Report which has been forwarded to us. The "Revenue Act of 1883," sec. 10, a copy of which we published in our December number, provides that imported plate, if found to be below standard, may be returned to the owners or agents for re-shipment, so that the grievance complained of by Messrs. P. Orr & Sons, is to a certain extent modified.*

STATEMENT *made by* P. ORR & SONS, *Silversmiths, of Madras, regarding their attempt to introduce into England a trial consignment of their Silver Indian Swami Embossed Work.*

In August, 1881, P. Orr & Sons sent to England 25 pieces of Indian silver work, consisting of cups, goblets, spoons, &c., weighing 335 ounces, and value about *Rs.*2,500. These articles were made of *rupee* silver, the current silver in India, and the only silver ordinarily procurable.

Import duty was charged by the customs in London at the rate of 1s. 6d. per ounce, and paid by the firm's English correspondents. All silver plate being required by law to be stamped by the Wardens of the Goldsmiths' Hall before being *offered for sale*, the Indian Plate in question was sent to the Hall and pronounced to be below "English standard," and notice was given that it would be destroyed. Every effort was then made to avert its destruction; the payment of any penalty was offered, or the entire withdrawal of the plate from the country proposed, in order to atone for the unwitting transgression of the law; but it "was out of the power of the Wardens to assent to the course proposed; they dare not return the goods." *There was no appeal*, and the whole parcel was completely "smashed and battered" beyond recognition (a specimen of this "smashing" was submitted to his Excellency the Governor of Madras for inspection). After addressing a petition to the Inland Board of Revenue, and much trouble and delay, the duty levied by the Customs was, as a special case, ultimately recovered.

With reference to the foregoing statement, we beg leave to remark:—

1. That we were not aware—the question never having specifically come before us—that rupee silver was lower than "English standard," a fineness arbitrarily adopted by the Hall, and which, it may be remarked, is lower than the French standard.

2. Apart from other considerations, it is manifest from our procedure that there was no desire or attempt on our part to evade the law in any particular; we paid the import duty, and with a light heart sent the plate to the Hall for stamping.

3. Notwithstanding that we were as foreigners in England, we were treated with merciless rigour, and our plate subjected to barbarian treatment, for we think that we may say that both in style and finish this plate was unique, and worthy of special consideration. One hoped that the articles not assayed might have been re-shipped to India without further sacrifice or injury to English interests, but it seemed as if nothing could satisfy that vindictive jealousy cloaked as "the law," which fitly dates back to the Middle Ages.

4. We wish, however, prominently to bring to notice that the imposition of the duty and the compulsory conformance to a particular standard are not the only or the most serious difficulties against which the importers of Indian or foreign silver into England have to contend.

5. When articles of silver plate are sent to the Hall they are, before marking, "scraped and assayed," a process which is so clumsily and ruthlessly performed that silversmiths in England find it best to send their wares for stamping before being polished or finished, and then to return them to the workshop. This course is not open to the Indian manufacturer, who must be content to run the risk of seeing his *finished* goods injured, in some instances, past hope of recovery. We beg to point out that it is this arbitrary power, wielded by the Goldsmiths' Hall, which virtually prohibits the importation of foreign silver-plate into England. It is astounding that such extraordinary privileges should be allowed to be exercised in this nineteenth century by a corporation who are responsible to no one, and amenable to no law, and consequently reign with absolute despotism.

6. It may be here parenthetically added, that "they manage these things better in France." The French will not only stamp silver of various degrees of fineness, but the operation itself is conducted with neatness and care, so that finished articles are stamped without suffering injury; the convenience of the manufacturer is further consulted in some cases by "controle officers" being deputed to workshops to assay and stamp plate.

7. We submit that the Hall-marking of gold and silver *plate* should, as in the case of gold and silver jewellery, be an entirely voluntary and optional matter.

8. It only now remains for us to observe that the recent large-minded abolition of duties in India on English manufactures should be followed by the mother country promptly and completely abolishing the silver duties, and sweeping away the absurd and anomalous privileges so banefully exercised by the Goldsmiths' Hall, and which are directly prohibitory of the production of Indian art and industry.

I have, &c.,
(Signed) P. ORR & SONS.
Madras, 23rd November, 1882.

REMARKS *by the Goldsmiths' Company on the foregoing Statements.*

1. The statement with reference to the quality of the plate sent by Messrs. Orr and Sons is absolutely incorrect. No one of the 55 pieces (not 25 pieces as mentioned by Messrs. Orr) was made of the quality of rupee silver, and the allegation that rupee silver is the only silver procurable in India is ridiculous.

In the first place rupee silver varies from 2 to 2½ dwts. only worse than the English standard, while of the 55 pieces sent to Goldsmiths' Hall by Messrs. Orr, no single piece was less inferior than 7½ dwts. worse than the English standard, and the great bulk of the plate was as much inferior as 15 dwts. worse than the English standard. There is no more difficulty in obtaining in India fine silver to mix with rupee silver than there is in any other country, and it is quite possible for Indian silver to be made up to the English standard.

Cases have indeed occurred, and can be vouched for by the Company, in which plate imported from India (and also from Japan and Burmah) has been so manufactured, and has passed the London Hall.

2. Before the plate in question was sent to Goldsmiths' Hall, Messrs. Orr and Sons' London agent called at Goldsmiths' Hall and informed the officials there that the plate was about to be sent. It is well known that rupee silver is not up to the English standard (and this might readily have been ascertained by Messrs. Orr, or their London agent), and, therefore, the gentleman in question was, on two separate occasions, informed of this fact, and urged to have a private assay of the plate taken before the plate was sent to Gold-

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* See Trade Notes for January, page 106.

smiths' Hall, and he was informed that, in the existing state of the law, the Goldsmiths' Company would be compelled to break the plate, should it be found to be under the legal standard.

Messrs. Orr's agent informed the officer of the Goldsmith's Company that Messrs. Orr quite understood that the plate would have to be sent to Goldsmiths' Hall to be marked, and that he was convinced that they believed the plate to be of the proper quality, and he therefore said that he should send it with confidence to the Hall.

The plate was accordingly sent to Goldsmiths' Hall without a private assay having been taken, as recommended on two occasions by the Goldsmiths' Company, and, the great inferiority of the quality of the silver having been ascertained, notice was given to Messrs. Orr's agent that the Goldsmiths' Company would be compelled to break the plate in accordance with the provisions of the laws regulating their proceedings in these matters. Upon this notice being given to Messrs. Orr, a correspondence ensued between Messrs. Orr and the Goldsmiths' Company, a copy of which, marked B., is enclosed herewith. Such correspondence speaks for itself. It will be noticed that not only did the Goldsmiths' Company act in strict conformity with the laws regulating the manufacture and sale of plate, by which laws they are bound equally with the manufacturers and the public, but that the Company actually went out of their way on two occasions by the advice which they gave Messrs. Orr's agent to endeavour to protect Messrs. Orr from the consequences of their own negligence and imprudence.

3. The "smashing" mentioned in this paragraph of Messrs. Orr's letter was simply a breaking sufficient to prevent the plate from being used before it should be re-manufactured, and was merely what was sufficient for this purpose. The duty would probably not have been recovered by Messrs. Orr if the Goldsmiths' Company had not exerted themselves in the matter.

Mr. Prideaux saw the customs authorities and also Mr. Garnett, the then Secretary of the Board of Inland Revenue, upon the subject, with the view to assist Messrs. Orr in the recovery of the duty; and it was mainly upon Mr. Prideaux's representations that an exception was made, and the duty returned to Messrs. Orr. The ill return which Messrs. Orr's agent makes for this gratuitous assistance will be seen from the newspaper cutting hereto appended.

4. This appears inconsistent with the statement of Messrs. Orr's agent in his letter of the 11th of October, 1881, as the agent then states that "it was quite understood" by Messrs. Orr that the silver would have to pass the English Hall before it could be sold, and if Messrs. Orr and their London agents did not take care to enquire whether rupee silver was up to the English standard, that was a piece of negligence on their part for which nobody but themselves can be held responsible. It is entirely incorrect to say that the fineness of the English standard is "arbitrarily adopted by the Hall." The standard of English silver is fixed by Act of Parliament and not by the Goldsmiths' Company, and the Goldsmiths' Company have no power either to raise or lower the standard prescribed by law. The standard has not been altered since the year 1720, when it was slightly lowered. Again, it is not the case that the English standard is lower than the French standard. There are two standards of English silver plate fixed by Act of Parliament; one (which is very rarely used, *and is purely optional*) is of the value of 11 ozs. 10 dwts. fine silver in the pound troy, and the other, which is the regular legal standard in use, is of the value of 11 ozs. 2 dwts. fine silver in the pound troy, or, expressed in decimals, ·925.

The French have likewise two standards for silver, their highest standard, which is compulsory for ornamental plate, as expressed in decimals, is ·950, and their second standard, which is the one adopted for useful plate, as expressed in decimals, is ·800, or 9 ozs. 12 dwts. fine silver in the pound troy, and therefore 1 oz. 10 dwts. in the pound worse than the ordinary legal standard in England, exactly the reverse of Messrs. Orr's statement.

5. The correspondence already referred to (and a copy of which is sent herewith) will show that Messrs. Orr as foreigners were not treated with any greater rigour than the Goldsmiths' Company are obliged by law to treat home manufacturers.

It is not correct to say that the plate was "unique and worthy of special consideration." The designs were of the ordinary kind of silversmiths' work, consisting of cups, mugs, spoons, muffineers, napkin rings, &c., and the work was not more elaborately chased than is the case with the generality of English work received daily at the Hall for the purpose of being assayed and marked.

Again, there were "no articles not assayed."

Every single piece was carefully assayed and found wanting.

The Goldsmiths' Company had no power whatever to allow the plate to be re-shipped, and the suggestion that there was any "vindictive jealousy" on their part is perhaps scarcely worthy of notice.

6. With reference to this statement the Company appeal with confidence to the evidence given before the committee on Gold and Silver Hall-marking in 1878 and 1879 (*see* particularly Questions 93, 94, and 95), evidence which shows that the work of scraping and assaying is performed in the best possible manner, and with as little injury as possible. There can be no doubt that finished works, when sent to be assayed and marked, suffer some injury in the first instance from the necessary scraping, but this is an injury which in most cases any silversmith can readily make good when the plate is returned to him.

It is material also to state that the English manufacturer *is required* to send his wares to the Hall in an unfinished state (an allowance of one-sixth of the duty upon the entire weight being made to him upon this account), while no such obligation attaches to the foreigner.

7. Here again the statements are most inaccurate and misleading. The Goldsmiths' Company are bound by, and are responsible to, the laws in force with regard to the manufacture and sale of plate, and it is very rarely that they have any complaint from manufacturers with reference to the manner in which they perform their duties.

8. With reference to this statement we may remark that the French method of dealing with plate is precisely similar to that employed in England, as the Goldsmiths' Company of London have ascertained both by a personal visit to the French Hall, and also by a written answer given by the chief officer of the Assay Office there to certain inquiries addressed to him by the Goldsmiths' Company. It is true that in France small articles, which cannot be scraped without injury, such as jewellery, *which in England are exempted from Hall-marking*, are tested by what is called the touch; but the French, recognising the inaccuracy of this method, by the law of 19 Brumaire, an 6 (9th November, 1797), require that the assay of all such articles as alone are here subject to obligatory Hall-marking shall be dealt with in the same manner as that employed in England, namely, by scraping and cupellation; as above-mentioned, there are only two legal standards of silver in France, and therefore we disbelieve Messrs. Orr's statement, that the French mark silver of various degrees of fineness.

We entirely disbelieve that the "controle officers" visit the workshops for the purpose of assaying and marking plate for the convenience of manufacturers. The "controle officers" visit the shops for a very different purpose.

9. We will make no remark upon the expression of opinion, except to state what is an undoubted fact, namely, that there

never was a time when the British trade of goldsmiths and silversmiths were practically so unanimous in their desire that compulsory Hall-marking should be retained in its integrity; and there never was a time when the Hall-mark was more sought after and appreciated by the public than at the present day.

There are serious objections to making Hall-marking voluntary instead of compulsory.

10. With the question of the abolition of the duty upon plate, the Goldsmiths' Company have always considered that they have nothing to do. This is entirely a question for the Government. The Goldsmiths' Company simply act as the agents and receivers of the duty for the Government, because the duty can be more easily collected by the Hall than it could be in any other manner. Persons interested in the abolition of the existing state of things have often endeavoured to create an impression that the Goldsmiths' Company derive pecuniary benefit from their Assay Office and from the collection of the duty. It cannot therefore be too often repeated, and insisted upon, that the Goldsmiths' Company derive no pecuniary benefit from *either* source. The Company are absolutely prohibited by the laws relating to Hall-marking from making any profit out of their *Assay Office*, and the one per cent. allowed by the Government to the Company as commission for the *collection of the duty*, does not pay the necessary cost of collection. In point of fact, during the last ten years the Company have made a loss of some £600 over their Assay Office, and a loss of more than £500 over the collection of the Government duty.

The Goldsmiths' Company do not in any sense exercise "absurd and anomalous privileges," or any "privileges" whatever. They simply perform duties imposed upon them by Act of Parliament, at the expense of a great deal of time and trouble, and at some pecuniary loss to themselves, but with (it is confidently believed) great benefit to the public, and the assent and approbation of the respectable members of the gold and silversmiths' trade.

I have, &c.
(Signed) Walter S. Prideaux,
Clerk.

Goldsmiths' Hall,
22nd March, 1883.

Extract Letter *from the Board of Trade, dated April* 13*th*, 1883, *to the Treasury.*

Sir,—I am directed by the Board of Trade to acknowledge the receipt of your letter of the 13th ultimo, in which you transmit copy of a statement of Messrs. Orr and Sons, of Madras, relative to the treatment of Indian plate imported for sale in this country when found at Goldsmith's Hall to be below English standard, and ask to be favoured with the views of this Board as to the maintenance of the restrictions now imposed by law upon plate, whether of home or foreign make, exposed for sale in the United Kingdom.

In order to be in a better position to comply with the request of the Lords Commissioners of the Treasury, the Board of Trade referred the statement of Messrs. Orr to the Goldsmiths' Company.

The Company have replied by transmitting to this Department copy of the letter on the matter addressed by them to the Treasury.

* * * *

The Board now desire me to offer the following observations for the consideration of the Lords of the Treasury:—

As regards the case to which Messrs. Orr's complaint particularly relates, there seems to be no question that the Goldsmiths' Company had by law power to act as they did. But they appear to show that they felt the injustice of the case, first by having advised Messrs. Orr not to send the plate to the Hall for assay, and by having afterwards assisted the firm in endeavouring to obtain a return of the duty.

* * * *

The Board of Trade are clearly of opinion that it is most desirable that measures of some kind should be taken with the object of saving manufacturers from the injury and loss involved in the breaking of plate under circumstances such as are described by Messrs. Orr.

I have, &c.,
(Signed) T. H. Farrer.

The Manufacture of Repeating Watches.

(From the *Journal Suisse d'Horlogerie.*)

(*Continued from page* 102.)

IT is important that the quarter snail is so filed that the arcs of the circle described from the centre are rigorously followed; in order to avoid the movement produced by the fall of the quarter-piece, since, at the moment that the surprise is on the point of jumping, it is only held, as well as the quarter-snail on which it is screwed, by the weak pressure of its spring against its circumference.

It often happens that the notches of the quarter snail are too far back, that is to say that the arm of the quarter-piece is on the point of escaping from the edge of the notch when the surprise is ready to jump. As it is not easy to hammer this snail, if the notches were not farther back than half the breadth of the arm, the examiner should be able correct this defect in the following manner.

The hand being always placed on the first division after each quarter, in agreement with the one-minute notch of the minute snail, the star and the surprise of the minutes should be made to jump about the third of a minute before the points, and that by their two springs; afterwards the jumping should be confirmed just on the points by increasing the play behind the surprise and the snail, by the opening in which the pin of the minute snail acts. It will be understood that as the quarter-piece is more than the third of a minute behind, at the moment of jumping, it falls fuller on the notch, when the piece is made to strike some seconds before the jumping.

It should, however, be ascertained that just on the hour the arm of the quarter-piece falls again with sufficient safety on the high part of the snail corresponding to the *zero* quarter, and if, immediately after the jumping of the star, the arm does not rest in all its width on the snail, the examiner ought to be able to easily hammer it, first taking care to temper it.

In the minute-pieces, there is less room than in those striking only quarters or five minutes, to obtain sufficient play before the surprise to disengage the pallet from the pressure of the tooth of the star, which produces, aided by the push, and in spite of a sufficiently strong burr on the centre arbor or the cannon pinion, a forward movement of the minute hand, each time that the star jumps on sixteen.

In effect, the talon of the surprise cannot pass the edge of the snail where it finds the zero minute tooth, for the arm of the minute-piece which is disengaged to the end should be able to act between the talon and this tooth; in making it strike at this moment, the piece should have given the hour and one minute before the hand has reached the first division after sixteen.

After that the examiner has increased as much as possible the forward play, if he notices that the pallet of the surprise receives the blow of the tooth of the star, he should reduce it behind, at the part which the tooth touches again, immediately after the jumping.

The equalisation and adjustment of the hours and quarters being finished, the verification of the minute snail now remains to be done. After having set in order the end of the arm of the minute-piece, which ought to be filed square, entirely sharp on the inside, and disengaged so that the fall of one tooth to the following may be fairly made, the spring of this piece should be put to a suitable strength; it ought to touch very lightly on the surface to keep it up to its place, and when it is disconnected from the slide and the train, it ought to descend the scale successively on each of the thirteen notches after each quarter, agreeably to the manner in which the snail is turned.

The hand being always placed in agreement with the first minute, the notches should be noticed which are too far back. Those minutes can only be retouched which are backward in striking, if some are given too soon, they should be left so; for the remainder, the difference is never very considerable, and as the minute hand advances while the hours, quarters, and minutes are striking, it is preferable, in all cases that the following minutes shall be given before, and not after, that the hand has arrived on the division.

The important point is that the centre wheel should be perfectly upright and the divisions of the dial equal from the centre.

In making the minute-piece descend the scale, it should be ascertained that the lifting does not remain overswung, retained by the point of the preceding tooth; when on the four quarters it remains caught on a large number of teeth, it is sufficient to file the extremity of the arm of the minute-piece, for it would be too much work to file the notches of the snail. When it only touches on a small number those notches may be touched up.

Sometimes the first of the fourteen minutes is too near to the third quarter; this defect may be corrected by lengthening the two arms of the hook pivoting on the quarter-piece, to hinder its descent in the cutting of the minute-piece. This plan ought not to be resorted to unless the fourteenth minute strikes before the locking has taken place.

In the frequent case where it strikes almost at the same time, it will be expedient to delay the moment when the locking is effected by lengthening the long piece, by filing the part of the quarter-piece which is coming to rest against the lifting of the large hammer, and lastly by increasing the action of the slide at the return.

STRIKING THE HOURS.

To ensure the hours striking well, it is necessary for the large hammer to have a sufficient lifting, and for the strength of the spring to be proportionate to its weight; the counter-spring ought to be weak enough to yield under the blow of the pin when the hammer strikes. This ought to be held at a certain distance from the bells by the adjusting screw, so as to touch it lightly in letting it escape after the half of its lifting; when the blade of the bell is strong and vibrates little, the hammer can be brought nearer than that.

There are many moans of increasing the tho lifting of the hour hammer. The first consists of lengthening the lever against which the teeth of the twelve-toothed rachet act; it is suitable to employ it, when, in pushing the rack strongly, there is a risk of making it pass a tooth too much, in making the arm "give" which rests against the hour snail. Another plan which has been previously indicated, consists of bringing the inner side of the lever nearer to the teeth of the twelve-toothed ratchet, of that which acts against the pin of the hammer. Finally, the examiner should also be able to replace this latter by a larger one.

After having increased the lifting of the hammer, it should be ascertained that the tooth of the lever, in escaping from those of the raxchet, does not strike against those following this would much diminish the sound of the bell. In this case, it should be brought nearer to the hammer by bending it near the block, and the inside of the lever should be filed without shortening the tooth.

In certain repeating works, the arm of the rack is long and narrow, so that it bends at the point like a spring, when it rests against the hour snail; this produces a movement in the star, which sometimes makes it jump before the hand has arrived on sixteen minutes. When it is struck at the moment that the star is going to jump at the tenth and eleventh hours, the arm can escape from the edge of the notch after the quarter-piece has fallen, and the piece strikes the following hour and three-quarters.

This defect can be corrected by placing on the plate, as near as possible to the sink of the star, a block, against which the outside of the arm just touches, and which prevents it from giving when the rack is pushed strongly; this block ought to leave the arm entirely free before it is just going to rest against the snail.

STRIKING THE QUARTERS, FIVE MINUTES, AND MINUTES.

When the strokes of the two quarter hammers are too close to each other, the teeth of the quarter-piece acting against the lever of the small hammer can be shortened so that this may strike more quickly. In the case where the lifting of this hammer should not be enough, the part of the lever which acts against the pin of the hammer ought to be bent or hammered, to bring it nearer to the pallet of the said lever; if this operation is not practicable, a larger pin should be put.

The intervals between the strokes of the hammer can also be increased by hammering the teeth of the quarter-piece to increase the lifting of the large hammer; but this plan cannot be employed in the minute-pieces, these teeth being too short to hammer; to obtain the same result, they should be brought nearer the lever as it has been already indicated, in tempering the quarter-piece, while exercising by the aid of two tongs, a traction following the plane of its surface.

When it should be expedient to increase or diminish the lifting of the hammer without changing the harmony, the examiner should be able, for the first case, to close the angle formed by the two parts of the lever by hammering them, or to put a larger pin, and, for the second case, to open this angle by filing the part acting against the pin; it is understood that the points of the teeth remain between them in exactly the same position; the duration of the intervals between the strokes of tho two hammers would not be changed.

When the strokes of the small, or the large hammer are too distant from each other, file the teeth of the quarter-piece which acts on the lever of the large hammer, in order that it may strike more quickly, and if by doing this the lifting of the large hammer is diminished too much, it should be increased by closing the angle of the arm with the pallet of the lever, or by changing the pin. The strokes of the two hammers can equally be brought closer by hammering the teeth of the quarter-piece which acts on the lever of the small hammer, after having stretched the teeth, it will strike slower; and if, in lifting, it nearly touches the bridge, or cock, the lifting should be taken away by filing the arm of the lever, In increasing or diminishing the lifting thus, the examiner must by no means change the duration of the interval beteen the strokes of the two hammers modified by either of these operations.

In *five-minute repeaters* when the first stroke of the fifty-five minutes is too near to the hours, the examiner should file the part in contact with the finger which brings back at the moment of striking the first of the eleven strokes, in such a manner as to obtain a sufficient interval. When the strokes of the small hammer are too quick compared to those of the hours, they may be made slower by filing the part of the five-minute-piece against which the finger slides in bringing it back; if that is not sufficient, the spring of the hammer should be strengthened, and in the case where the lifting of this latter should not be sufficient, it will suffice to increase it, to diminish the thickness of the pipe of the five minute piece, the teeth of which should be brought sensibly nearer to the small lever by the effect of the pressure of the spring of the said piece.

This last plan can can also be employed to avoid hammering the arm of this piece, when it passes a tooth too much on one or more notches of the five minutes snail.

In *minute repeaters* a slackening is often observed when the last minutes strike; that proceeds from the increasing resistance offered to the train by the different springs, at the moment when the minute-piece is nearly brought back. If, after having weakened these springs, this defect still remains, this indicates that the spring of the train is not set up sufficiently, or else that it is not free at this moment; it is sometimes sufficient to change the position of the barrel one way or the other, in order that the train may more easily surmount the drag occasioned by the springs of the repeating work when the stopping is going to take place.

(*To be concluded in our next.*)

Mechanism for Controlling and Registering Clocks.

Improvements Patented by Anatole Lasmoles, Chateaurox, France.

This invention has for its objects to obtain security of control, by placing it in a fixed position, and without the reach of the night watchman, who has only to move an electric contact-piece or switch placed in every building visited by him; also to record the exact time of the visit and how many times the apparatus has been set in operation; also to provide an electric dial or sheet which indicates the places visited, and the number of visits.

Also to exercise a control over carrier pigeons, so as to indicate the arrivals without interfering with the ordinary work of the attendant, and also to serve as an ordinary clock while capable of performing the functions described above.

The construction and operation of the apparatus is as follows: If the electric contact is established, a pawl is lifted thereby disengaging a counting disc or wheel, which turns until the said pawl meets another notch of the counting wheel, after which the pin of a stop-wheel strikes against a face or buffer of the pawl. In turning, the counting wheel sets in motion a lever by means of suitable projections, and lifts a movable dial which then strikes a pointed clock-hand, is perforated, and shows the exact time.

The dial is afterwards brought back into its previous position by means of springs.

At the same time the counting wheel lifts by means of suitable projections another lever, thereby moving a wheel which carries a pointed clock-hand. If then the movable dial is lifted, it meets the point of the said hand and is perforated, after which the hand is placed back by a spring.

At the same time a pin attached to the counting wheel releases a tooth of the totalizing tooth-wheel and causes the pointer which it supports to advance one division. The pointer shows how many times the apparatus has been in operation.

An alarm apparatus may be combined with the clock by providing a hammer placed so as to strike a removable gong.

If used for the control of carrier pigeons the door of the pigeon-house is lifted by the pigeon when entering, thereby coming in contact with the pawl described above, releasing the wheel and operating the hammer, which strikes the gong.

The accompanying drawings illustrate this invention:—

Fig. 1 represents a front view of the whole apparatus after the dial has been removed.

Fig 2 is a front view of the perforating mechanism without the star-wheel a and the dial.

Figs. 3 and 4 are side views of the apparatus, showing the working of the locking plate g, of the lever e, as well as of the perforating hour hand m^1.

Fig 5 is a back view showing the arrangement of the going part after the plate has been removed.

Fig. 6 is a side view of the going part.

Fig. 7 shows the position of the lever l after the same has been released.

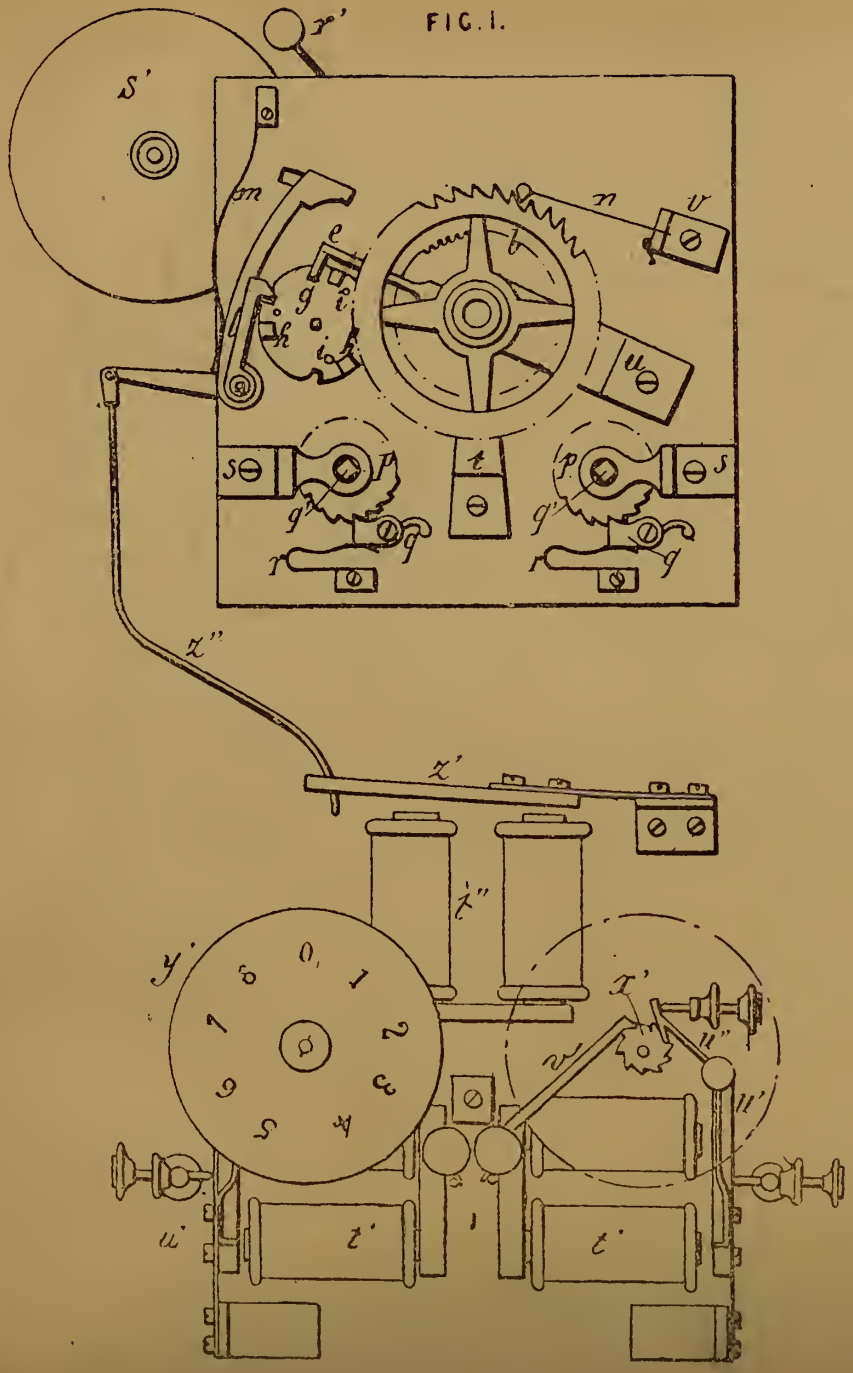
Fig. 8 is a perspective view of the locking plate or notch-wheel g.

Fig. 9 is a front view of the dial and

Fig. 10 a side view of the dial showing the arrangement of the hands.

a represents the star wheel carrying the totalizing hand o^1.
b the hour wheel carrying the hour hand m^1.
c an ordinary dial wheel connected with the hour wheel.
d the minute wheel carrying the minute hand n^1.
e a lever depressing the hour wheel b.
e^{11} the pivot of the lever e.
f the spring lifting the wheel b.
g locking-plate or notch wheel provided with notches which serve to limit the duration of the alarm.
h small cones or projections on the locking plate g causing the lever e to oscillate.
i pins on the locking plate g serving to turn the star wheel a for one tooth.
l detent serving to discharge the locking plate g.
m spring depressing the detent l.
n spring discharging the star wheel a.
o spring arbor.
p ratch of the regulator.
q click of the ratch.
r spring of the click.
s bridge of the spring arbor.
t bridge of the dial wheel c.
u bridge holding the star wheel a.
v bridge holding the discharging spring n.
x centre wheel of the dial-train.
y toothed spring barrel driving the pinion a^1.
b^1 wheel driving the pinion c^1, the notch-wheel g is mounted on the prolongation of the arbor b^{11}.
c^1 pinion of the anchor wheel d^1 or of the wheel e^1.
d^1 anchor wheel.
e^1 driving the pinion f^1.
f^1 pinion of the wheel g^1.
g^1 pin wheel.
h^1 fly regulating the speed.
i^1 the anchor on the arbor of which is mounted the hammer r^1.
k^1 forelock or pin of the wheel g^1, this pin turning with the wheel g^1 engages in a notch of the part e^{11} of the lever e, which causes the latter to release the locking plate.
l^1 are plates.
m^1 the hour hand provided with a point or tooth m^{11} for perforating the moveable dial.
n^1 the minute hand.
o^1 the totalizing hand indicating the total of the controlling of the various places connected with the apparatus.
p^1 fixed dial controlling the number of perforations.
p^{11} moveable dial made of paper, held by two collars q^{11},

FIG. 1.


r'
s'
m
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y'
0
1
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3
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5
6
7
8
x'
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u''
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FIG. 2.

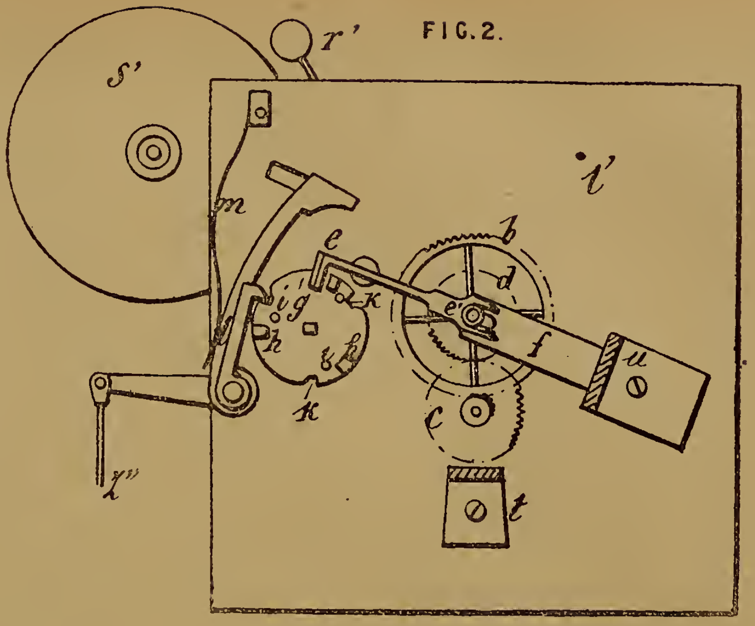
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FIG. 3.

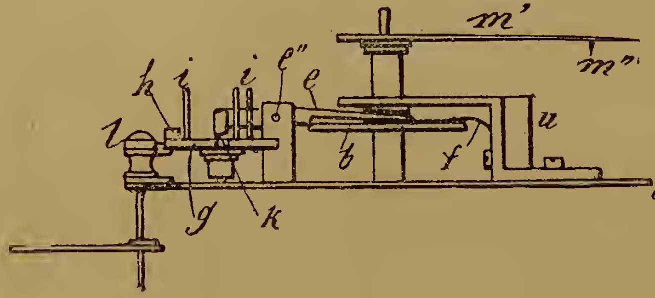
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FIG. 4.

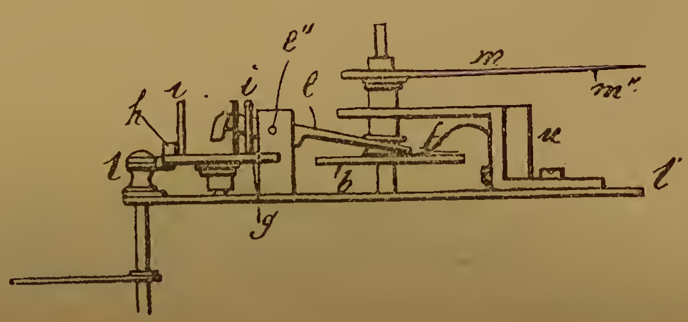
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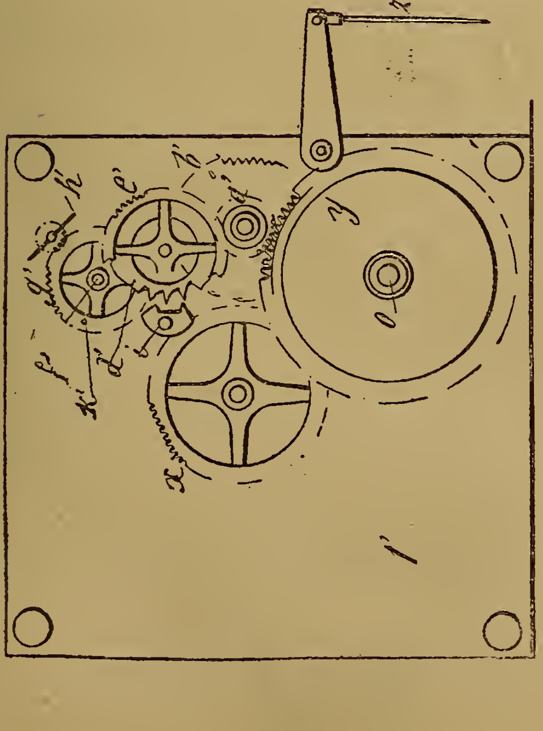
FIG. 5.


h'
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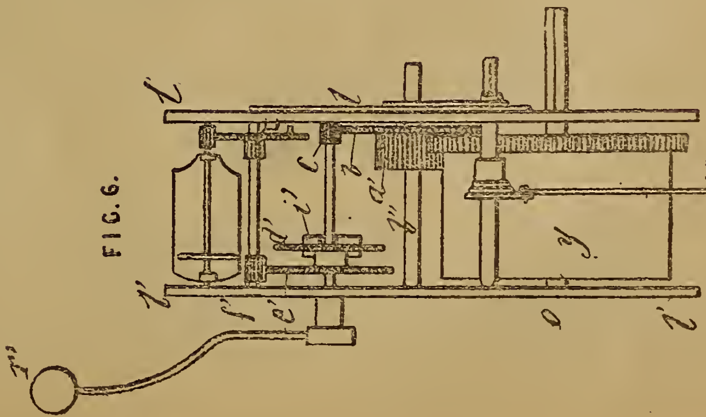
l'

FIG. 6.


l
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l'
f'
e'
r''

FIG. 7.

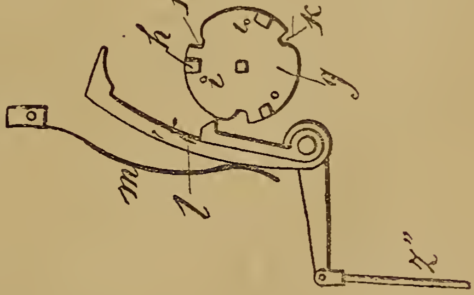


FIG. 8.

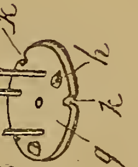


FIG. 9.

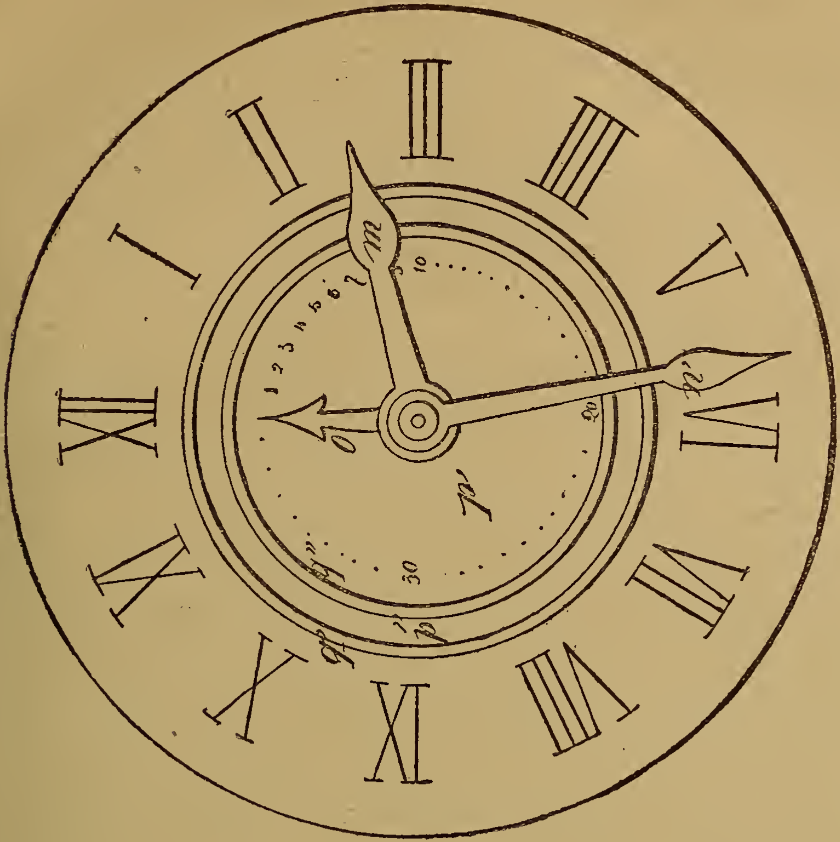
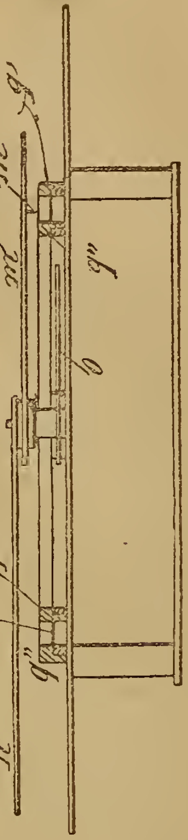

m
n'
o
p
p''
q''
10
20
30
1 2 3 4 5 6 7

FIG. 10.



it may be removed at will. This dial is perforated by the hour hand m^1.

q^1 winding stems.

r^1 hammer mounted on the arbor of the anchor wheel and striking against the bell s^1.

t^1 t^{11} electro-magnetic bobbins.

u^1 spring serving to replace the ratchet wheel x^1.

v^1 detent of the ratch x^1.

y counting dial mounted on the arbor of the ratchet wheel x^1.

z^1 armature serving to discharge the detent l.

z^{11} rod connecting the armature with the detent l.

The apparatus works as follows:

When electric contact is established two movements take place simultaneously.

1. The spring u^1 is attracted by the magnet t^1 whereby the part u^{11} causes the ratch x^1 to move one tooth, which causes the counting dial y^1 to advance one number.

2. At the same time the armature z^1 is attracted by the electro-magnet t^{11} and the rod z^{11} fixed to the armature z^1 lifts the detent l and consequently discharges the locking plate g which turns till the detent l meets another notch k when the forelock or pin k^1 of the wheel g^1 strikes against the projection l^{11} of the detent l, during this turning of the locking plate g one of the projections h comes in contract with one end of the lever e, lifts the same by causing it to oscillate round its axle e^1 while the other extremity e of the same lever depresses the wheel b as well as the hand m^1, the latter while being depressed meets the dial of paper p^{11} which by means of the pin or tooth m^{11} is perforated at the time indicated by the clock on which the apparatus is mounted.

Furthermore one of the pins i of the locking plate g meets the star wheel a and causes the same to move one tooth, in consequence of which the hand o^1 mounted on the arbor of the star wheel a is advanced for one number on the dial p^1 and thus indicates how many times the apparatus has been operated. After the lever e has caused the movements as above described, it is brought back into its previous position by means of the spring f which at the same time lifts the wheel b and the hand m^1. During the whole time the locking plate g turns, the hammer r^1 strikes against the bell s^1; this bell s^1 is adjustable.

The movement of the hammer is a vibrating movement produced by means of the anchor i^1 which discharges but one tooth of the wheel d^1 at a time; in this manner the apparatus becomes an alarm.

The detent l is brought back in its previous position by means of the spring m.

It is sufficient to establish another electric contact, to reproduce the operations as above described.

If the apparatus is used for the control of carrier pigeons the door of the pigeon house is arranged in such a manner that the pigeon when entering the pigeon house causes the door to establish the electric contact, the detent l discharges the mechanism, the bell announces the return of the pigeon, and the dial p^{11} indicates the time while the dial p^1 indicates the number of pigeons returned.

The motion of the hand m^1 may be combined with the dial p^1 without departing from the nature of the invention.

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The *Pawnbrokers' Gazette*, in a review on the trade of the past year, makes especial reference to the trashy and flimsy nature of many of the articles of wearing apparel deposited in pledge, and adds:—If we go to watches and jewellery we find the same characteristics of inferiority in value and quality. Everything is made to sell "cheap," consequently as pledges they are of little value.

Standard Time.

Report of the Committee of the American Academy of Arts and Sciences on the Proposed Change.

The special committee—consisting of Wolcott Gibbs, General Francis A. Walker, and Professor J. Rayner Edmansd—appointed last month* by the American Academy of Arts and Sciences to consider the proposed change of standard time, have prepared the following report, which will be presented to the Academy at its next meeting:—

"To the President of the American Academy of Arts and Sciences.

"Sir—The committee appointed to consider the advisability, with reference to the public convenience, of an acceptance by cities and towns of the system recently adopted by the railroads of the United States and Canada, by which the time will be uniform within each of five sections of North America, respectfully recommend the general introduction of the system for the following reasons:—

"It is of the greatest practical importance in a business community and among travellers to have an accepted standard time, to which well constructed clocks and watches conform. True solar time is not regular enough for this purpose, since clocks cannot be made to keep time with it. 'Mean time' is an arbitrary device which overcomes the difficulty. At different seasons of the year it is alternately faster and slower than true solar time, yet it serves practical purposes so well that many persons are ignorant of the fact that difference exists. As the division of the day into twenty-four hours and the calling of noon 'twelve o'clock' are both mere conventional arrangements, no difficulty has been found in calling it twelve o'clock when an imaginary or 'mean' sun crosses the meridian, although twice a year this mean noon varies more than a quarter of an hour from the solar noon.

"For places in different longitudes mean noon occurs at different instants. Many a suburban resident would find his watch a minute wrong by city time should he keep it true to the local time of the town where he lives. But he fails to notice this fact because none of the clocks in his town show the local time. Suburban clocks are made to agree with those of the city, and the city clocks often show the time of some larger city. For example, there is hardly an inland city in New England which uses its own local time. Clock time, therefore, is arbitrary and conventional in nearly every respect. It is an invention which has been modified from time to time to suit practical conveniences. Even in legal matters no one would think of appealing to the *true* solar time, but, in the absence of statute, would rely upon whatever standard is used by common consent.

"The greater importance of precise time to us than to our ancestors is due to our increased facilities for dealing with those who live at a distance—to the railroad, the telegraph, the telephone, and the fast mail. The same causes make it the more necessary to be punctual in appointments with neighbours. It is difficult to realise how much more important an exact knowledge of the time is for purposes of this sort than for all others. Few persons really appreciate the number and variety of interests which depend in one way or another upon the arrival and departure of trains. This is especially true of a city surrounded by well-developed suburbs. A large amount of the business of Boston, for example, is done by people who enter and leave the city daily by railroad, and the number of these increases every year.

"The consideration which induces a community to allow its time to differ from the local time is the existence of a railroad, which uses the time proper to some other longitude.

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* October.

There are no instants marked out by Nature as the times for men to perform their daily recurring acts. Hours for meals vary widely, and people show the latitude which exists in the choice of times for beginning work or amusements, by taking even hours and half-hours in preference to the intermediate quarters or smaller divisions. Whatever be the standard of time, men's daily affairs can be appointed according to convenience; and if it be desired to use even hours and half-hours by the clock, the railway standard offers as many chances for convenient arrangements as does local time. The best plan is, then, for all the timepieces, public and private, to conform to that standard. As each railroad carries one standard to two termini, this plan is inconsistent with the general use of local time.

"Heretofore there have been over fifty different standards in use at once upon the railroads of the United States and Canada. In many places, moreover, where two or more standards are used, the local time enters to increase the confusion. Remedies for this state of things have been studied by able scientific men, discussed at length by learned societies, and developed practically by railroad managers. All purely ideal solutions have had to give way to those considerations which affect the *convenience of the public.* For example, an early suggestion was for the railroads to use one universal standard, while each community should use its own local time. But such a scheme is visionary, since neither the railroads nor the people would put it into practice. According to the plan which the railroads have recently adopted, the minute hands of watches all over the country are to be in coincidence, but the hours are nowhere to depart far from local time; and thus the troublesome necessity of allowing for a difference of an odd number of minutes is avoided. Again, the boundaries between sections using successive hours are to be fixed with due regard to economic considerations.

"Those American communities which have heretofore had their own local times must now consider whether to retain them, or submit to the temporary inconvenience of adopting the new standard which is to come into use by the railroads. The recurring seasons of the year and the gradually altering conditions of a city often call for altering the time set to start a train, begin work, or open a public entertainment. Some inconvenience immediately results, but it is quickly compensated. If the standard of time be changed, many appointments will remain the same by the clock, with positive improvement in some cases, while others will be soon shifted according to convenience. Men will not continue long to do things too late or too early in the day just because the standard has been altered. Suppose, for example, that the clocks of a city are put back a quarter of an hour. If the time set for opening a school or factory had heretofore been thought rather early in the day, the change would be beneficial. If, on the other hand, the hour for opening had been thought rather late, the selection of a half-hour earlier by the clock would effect the same improvement. In a few weeks after the introduction of the new standard people will be amazed to see how little is the difference it has made in matters about which anxiety is now expressed.

"The introduction of uniform time will be no new experiment. In the year 1848 England, Scotland, and Wales adopted Greenwich time as a standard for the railways, the change for the western part of Scotland exceeding twenty minutes. This railway standard is now used for all ordinary purposes throughout the island. The evils which some people feared would accompany or follow its introduction never arrived, and the experience of a generation with uniform time has not developed any desire to return to the system of local time.

"The American case only differs from the British in the breadth of our country, which requires to be divided into several sections, whose standards differ by whole hours. Each section, however, is comparable with Great Britain. It is true that a city located upon a boundary between sections does not reap the full advantage possessed by more centrally located places, but the new system will be better than the old even on the frontiers of the sections.

"Let us trace the effect of the adoption of the new standard by the railroads upon any city which has heretofore been able to impose its local time upon the surrounding country, taking Boston as an illustration. Evidently the very causes which brought the time of the neighbouring places into coincidence with that of the larger city will now carry the time to those places over to the new standard, which in this case is nearly that of Philadelphia. That is; Taunton and New Bedford, Worcester and Springfield, Fitchburg and North Adams, Lowell and Concord, Lawrence and Dover, and Portsmouth and Augusta have heretofore used Boston time solely because their railroads did so; but when the railroads give up Boston time, the bond will be broken, and Boston can only preserve the uniformity by conforming to the new standard.

"Such considerations lead us to the conclusion that any city, however large, which maintains its local time after the railroads have deserted it in favour of the new standard, will isolate itself from the time of the country, and bring constantly recurring annoyance upon its citizens, its visitors and those who deal with it by telegraph.

"In order to avoid perplexities for the first few days under the new system, it is important that people throughout the country should realize that we have now the consummation of a scheme deliberately considered in all its details, and brought about by means which insure its permanence. The movement is irresistible. Officials and local boards, with which the authority may lie, should therefore take formal action in favor of it. Mills, banks, brokers' boards and schools should announce their intention to conform to it. Lawyers and insurance companies should prepare themselves to use the slight verbal precautions which will prevent litigation arising from any uncertainty during the first few days following the change; and individuals generally should adapt their plans to the new arrangements. Already the railroads are prepared. But inaction on the part of communities leaves room for possible misunderstandings and legal difficulties which would be averted by a little foresight and promptness of action.

(Signed) "Wolcott Gibbs,
"Francis A. Walker,
"J. Rayner Edmands,
"Committee."

A Good Going Clock.

Mr. James Dann, Turret Clock Maker, &c., of Wisbech, sends us the following paragraph from the *Wisbech Advertiser*, of October 10th, 1883:—

The Town Clock.

In September, 1880, I thoroughly cleaned the clock, and from that time the hands of the clock have not been altered at all either way. So accurately was the clock apparently going, that, at the commencement of the present year, I thought I would take the rate of variation, which has been as follows:—January 1st, 48 secs. fast; April 1st, 52 secs. fast; June 1st, 56 secs. fast; September 1st, 64 secs. fast; October 1st, 56 secs. fast. That is a mean rate of eight-tenths of a sec. per month. I always keep the clock about 30 secs. fast; but as the clock was going so very steadily, it has been allowed to run until it became one minute fast. I make it a practice to go through the clock, usually in the autumn, and to oil and clean parts of it, so as to protect it in the coming damp weather of the winter. Some will perhaps say, "Why not keep the clock at exact time, instead of a half-minute fast?" My reply is this. Ours is a large parish, and the clock can be heard a distance of six miles. Now, sound travels slowly, and anyone hearing the clock strike that distance off, won't hear it till half-a-minute after the time. Then again, if exact people complain of the clock being slow, it should be pointed out that the hands always show half-a-minute slow just before they jump for the half minute, so that by keeping it 30 secs. ahead, it really indicates the mean time.

Trade Notes.

In *Chambers's Edinburgh Journal* for March 19th, 1836, we find the following paragraph relative to the "good old times" of the Chronometer Trade:—From the duplicate of an official statement now lying before me, it is stated that the Lords Commissioners of the Admiralty, having advertised a premium of £300 for the best chronometer which should be kept at Greenwich Observatory for trial, one year, thirty-six were forwarded by the principal chronometer makers in London, and were kept during the year 1823. It was announced that if any chronometer varied six seconds, it could not obtain the prize at the end of the year. The chronometer marked 816 gained the prize, having kept time for many months within "one second and one eleven hundredth part of a second!" This is certainly the best chronometer on record. Such perfection was never before attained, and it justly excited the astonishment of all astronomers, and of the Board of Admiralty.

The Study of Coins and Medals.—Mr. Reginald Stuart Poole, LL.D., Keeper of Coins, British Museum, in delivering a lecture at the Royal Institution on January 15th, on the interest and usefulness of the study of coins and medals, said that the coin and medal department at the Museum was now recognised as the foremost anywhere to be found, and this was largely due to the fact that no foreign museums printed systematic catalogues. Amateur collectors were unfortunately falling off in numbers, and as the older collectors died their collections were most frequently purchased by foreign museums. The lecture was chiefly confined to Greek medal art, and it was shown how at successive times the medal artists seem to have been under the influence of great sculptors and great painters. Medal work occupied an intermediate position. It did not possess the roundness of sculpture, but it might have almost the lights and shades of painting. The Greeks well knew the colour effects produced by time on bronze, on silver and on gold, and had different methods of working with an eye to this. As regarded the form of a medal, whatever the device they never attempted a circular shape or a flat surface. The information to be obtained from a study of medals was very varied. They corrected historians, gave individuality to the appearance of rulers, and as each city had its special cultus, the attributes represented for the different deities were an invaluable help in mythology. In art history coins filled in gaps, the lecturer thought, where sculpture failed, and in conclusion he expressed a hope that the ranks of amateur collectors might in the future be largely increased.

British Horological Institute.—The half-yearly general meeting of the members of the British Horological Institute took place on Tuesday evening, January 15th, in the hall of the Institution, Northampton-square, Clerkenwell; Mr. W. Chapman, F.R.G.S., in the chair. The report, as read by the secretary, Mr. F. J. Britten, stated that the whole of the classes connected with the society were progressing satisfactorily, and the students in the theoretical class were remarkably successful in the late examination conducted by the City Guilds Institute. The council believed the Horological Institute, which was the first trade society to provide technical classes for its young members, now offered the most complete course of instruction to be obtained by learners in any craft. In response to the suggestion that the public should have an opportunity of obtaining mean time from the institute, the council had purchased an 18-inch double dial to exhibit Greenwich time in the lecture-room and towards the street. During the past half-year nineteen members had been elected. There were at present on the books 448 members and thirteen associates. The silver medal of the Turners' Company, placed at the disposal of the institute, and offered this year to the producer of the best specimens of gold or silver watch-cases, had been awarded to Mr. George H. Harwood. The chairman moved the adoption of the report. He congratulated the members on the success of the society. The enlargement of the building would shortly be completed, and he thought they might look forward to a very successful year. To enable them to make this enlargement the Goldsmiths' Company had presented the society with £500. Steps were being taken by the council to procure a better and more reliable lubricant for the use of chronometer and watch makers, and it was to be hoped they would succeed in their endeavours. The motion was seconded by Mr. Glasgow and unanimously carried. A vote of thanks was accorded to the chairman, and the proceedings terminated.—*Daily Chronicle.*

Polytechnic Young Men's Christian Institute.—The distribution of prizes to successful students in the classes of the above institute took place on January 17th, Mr. W. Fowler, M.P., presiding. Mr. Quintin Hogg, one of the hon. secs., stated that the first year's work had been eminently successful. The classes, which originally numbered eighty-two, had been increased to 144. By Christmas last, the number of students reached 5,000, the outside limit which they were then able to accommodate; but since that time they had secured an additional house, which would enable them to receive 8,000. The entrances up to date were 30 per cent. above those of last year. At the examination of the City and Guilds of London Technical Institute the students of these classes had been more successful than any others, having carried off four silver and six bronze medals, besides about seventy certificates. The Lord Chancellor then distributed the prizes, which numbered several hundred. In a brief address to the students the noble and learned Earl expressed the warm interest he had always felt in institutions of this character. He had special pleasure in being present on that occasion because he happened to be chairman of the City and Guilds of London Technical Institute, many of whose certificates had been gained by the students of the Polytechnic Institute. The necessity of technical education to enable England to maintain the pre-eminence she had hitherto enjoyed among the manufacturing nations of the world, was now acknowledged on all hands, and every effort was being made by the City and Guilds Institute to promote that object. He warmly congratulated Mr. Hogg and his friends on the great success which had attended their untiring and self-sacrificing efforts in connection with the Polytechnic Institute and its classes, which, he was glad to see, comprehended almost every branch of education. Such work as was done in those classes was calculated to be beneficial not only to the students themselves, but to the British nation and to the world at large. The young men who had come before him to receive prizes were evidently hard workers, and the fact that they were so was likely to improve the health of both mind and body;

but they were entitled to rest and change, and he was pleased to know that the Institute provided wholesome, social, and other recreation. No religious test whatever was applied to the workers admitted to the classes—and he rejoiced that the profession of Christianity should be combined with the desire to promote on the most liberal basis the acquisition of knowledge, the improvement of skill, and the encouragement of industry. On the motion of the chairman, seconded by Sir J. M'Garel-Hogg, M.P., a hearty vote of thanks was accorded to the Lord Chancellor, a similar compliment being paid to the teachers of the classes, on the proposition of Mr. Philip Magnus.

John Henry Dallmeyer, the eminent optician, died in the 53rd year of his age, on the 30th December last, during a voyage to New Zealand, where he had been sent for the benefit of his health. Mr. Dallmeyer was a native of Germany, which he left for England in 1849. At that time he entered the house of the late Andrew Ross, who bequeathed to him the bulk of his optical appliances for the manufacture of telescopes. Mr. Dallmeyer devoted great attention to the production of photographic lenses, for which he was specially famous. He was elected a member of the Society of Arts in 1859.—*Society of Arts Journal.*

[It was with much regret that we read the above. Mr. and Mrs. Dallmeyer paid us a visit on May 15th, last year, shortly before the birthday of their eldest son.—Ed.]

A large clock has just been erected in Hammerwich Church, near Lichfield, by Messrs. John Smith & Sons, Derby. It is fitted with all the latest improvements, it strikes the hours, and has one dial. The same firm have a large clock in hand for a Mission Church at Norfolk Island.

Royal Visit to the City.—Yesterday H.R.H. the Duke of Albany paid a visit to the City to inspect Sir John Bennett's collection of clocks, from which he was pleased to make a selection for Her Majesty the Queen, at Osborne.—*Daily Chronicle*, January 19th.

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Bronzes.

By C. D. E. Fortnum, F.S.C.

(*Continued from page* 92.)

It has been often asserted that Torell was of Italian birth or origin; but, on the other hand, it has been shown that lands were held in Lincolnshire by one Torel, as stated in Domesday Book, and that the name Toroldus also occurs in reference to holdings in Suffolk and Essex. Again we find one William Torel, son of William Torel, just deceased, recorded in "*Excerpta e Rotulis finium*" 6th Henry III., 1222, as holding lands in Essex and Hertfordshire. It may therefore be fairly argued that the artist of the tombs in question was, if of another family, yet English born.

The monument to Grosseteste, Bishop of Lincoln (1253) "had an image of brass over it." Next in date, and the only monument of its kind still remaining in England (but not of English workmanship) is the tomb at Westminster, of William of Valence (1296). This is by the artists of Limoges; a stone altar-tomb, surmounted by one of wood, with niches in the sides, formerly enriched with statuettes, upon which reposes the recumbent effigy, of wood, plated with copper, gilt, and richly enamelled, but inferior in modelling to the work of Torell.

We have already referred to the tomb of Walter Merton, Bishop of Rochester, the work of Magister Johannes Limovicensis, and we know that at that period much enamelled work in vessels, coffers, etc., was imported from France into this country under the influence of the Court, and that English goldsmiths, able of their craft, and much patronised during the reigns of Henry, of Edwards II. and III., and Richard II., also acquired and practised the art of enamelling. These men worked not only in the more precious metals, but vessels of various kinds were fashioned in bronze and latten, and occasionally inscribed in Lombardic, and subsequently in "Gothic" character. One such is inscribed "*Vilelmus Augetel me fecit.*"

Edward III.'s (died 1377) tomb in Westminster Abbey was probably the work of Torell's pupils—the face of the effigy perhaps cast from a mould of the features—but it has not the excellence of the master's work, and the remaining smaller figures on the sides are still less to be admired. Enamelled copper shields, blazoned with the royal heraldry, adorn the lower tomb; on either side of the effigy are piers with niches containing angels, and supporting the rich canopy above the head.

The tomb of the Black Prince (died 1376) is in the glorious cathedral of Canterbury. The somewhat stiff, but ably modelled and highly elaborated cast and gilt bronze figure, in full relief, lies on its table, the face calmly expressive, the figure in chain armour; some of the details are enriched, the crown with jewels, the sword-girdle, the spurs, etc., enamelled, as are the armorial shields and mottoes affixed upon its sides. We do not know who was the able bronzist, but the work, by some authorities, is supposed to be foreign. We next have the tomb of Richard II. and his Queen, Anne of Bohemia, with their effigies, executed during the King's lifetime, by Nicholas Broker and Geoffrey Prest, coppersmith's of London—"images, likenesses of the king and queen, of copper and laton gilded." These figures, again, are cast in high relief rather in the round—and are affixed to a broze slab covering the marble altar-tomb. Like the other tombs at Westminster, the marble work and ornamentation have been sadly defaced, but the effigies are remarkably preserved. The brasses to Robert de Waldeley (1397), and to Alianor de Bohun (1399), in Westminster Abbey, are noteworthy, also the brass figures of a man and wife, of life size, in the chancel at Ingham.

The Lancastrian House did not develop or encourage the higher arts in England, and during the period of its power, native art seems to have been on the decline; nor indeed until Flemish influence became dominant did sculpture and metal work revive. But there was no lack of liberality shown in the erection of the monument to the fifth Henry, the wooden core of whose effigy, stripped of its covering silver plates, and its massive head cast in the same metal, is all that is left to us by robbers of the time of the Reformation.

Perhaps the finest work in stone sculpture of this period in England is the tomb to Lady Arundel, at Chichester; this was carved in the earlier years of the century. Wykeham's tomb at Winchester is also noteworthy. At Warwick is the grand tomb of Earl Richard Beauchamp, who died in 1439. This was the work of English hands, John Essex, the marbler; William Austin, the founder; Thomas Stevens, the coppersmith; who engaged to execute the work, on the 13th June, 1453, "of the finest latten," that is, "to cast and make the image of a man armed," and "fourteen embossed images of lords and ladies in divers vestures called weepers." But, as in too many other instances, the means and the material were at hand, but the heart was wanting; although pretentious and grand in design, the modelling and execution of the figures are poor and careless.

With Henry VII. we enter the sixteenth century, when the Italian *renaissance* was extending its influence far and wide. His will, dated in 1509, gives full instructions for the erection of his monument, the effigy upon which we have already referred to as the work of Torregiano. The tomb is surrounded by a "brass gate in the manner of a closure of coper and gilte," which was begun during the king's lifetime and before the casting of the effigy. "Humfray Walker, founder, and Nicholas Ewen, coppersmith and gilder," were employed, and all this portion may probably have been the work of English artists. It is adorned with statuettes in niches, but of very inferior modelling and workmanship to the effigies and statuettes upon the tomb, the style of which denotes the Italian master's hand. Torregiano is said to have also executed a bronze effigy of the Earl of Derby for Ormskirk Church, Lancashire.

During the following reigns we find painting and ornamental design mainly under the pencil and teaching of Hans Holbein; and sculpture by Florentine artists already named, while some Flemish influence supervenes. Noble tombs were executed in marble and alabaster, as that to Sir Giles Daubeney in Westminster; to the Countess of Hertford, in Salisbury Cathedral; to Queen Elizabeth (by Maximilian Poutram), and Mary of Scotland, etc. Brasses were still abundantly used for sepulchral record, incised for the most part by able English hands, who also produced good examples in the various forms of the jeweller's and silversmith's, the workers in brass and copper, and tho smith's crafts; but in design they were almost always subservient to foreign teaching. So indeed it continued, more or less, during the period of the Stuarts and of Cromwell.

By Nicholas Stone, a famous sculptor, are the figures of Sir George Villiers (died 1605) and his second wife, in St. Nicholas' Chapel at Westminster. There also, in Henry VII.'s Chapel, are two huge monuments, typical of the grandiose but bad style of the seventeenth century, the details of which are executed with care and ability. One to George Villiers. Duke of Buckingham, was erected in 1633, and is rich in gilded metal and elaborate marble work above, beneath and around the recumbent figure, the other, still more pretentious, is in memory of the Duke and Duchess of Richmond, 1623; beneath a baldachin of open gilded metalwork, sustained by bronze allegorical figures at the four angles, and surmounted by a gilded one of Fame.

The bronze statue of James II. in Whitehall Yard, set up in 1685, was by Grinling Gibbons (1648-1721), the celebrated wood carver, of Dutch origin. The portico of Drury Lane Theatre is enriched by a leaden figure of Shakespeare, cast by Sir Henry Cheere, "the leaden figure man at Hyde Park Corner," after a model by his master, Peter Scheemakers (1691-1770), by whom also was the statue in bronze to Edward VI., at Guy's Hospital. By Cheere, again, were cast some bronze busts of eminent fellows of All Souls College, Oxford, and the statue of Christopher Codrington, the founder of the library in which they are placed. The equestrian statue of the Duke of Cumberland in Cavendish Square is also by Cheere. The bronze figure of Henry VI. at Eton College was by Francis Bird (1667-1731).

Bird worked under Sir Christopher Wren, at St. Paul's, executing the *alto-relievo* in the pediment representing the conversion of that saint; the statue of Queen Anne, and other works in stone. John Van Nost, an Englishman, but of Dutch family, worked in Ireland, from about 1750 to 1787, where he made the equestrian leaden statues of William III. and George II. in College Green and Stephen's Green.

Although open to criticism in the conception and surroundings of its principal figure, the group in bronze at Somerset House, by John Bacon, R,A. (1740-1799), perhaps the most clever and purely English sculptor of his time, is very ably modelled. It represents George III. with a fine recumbent impersonation of the river Thames, and is one of the few satisfactory monuments of this material with which London is but so poorly furnished; the noble statue of Charles I. always excepted. By his second son, John Bacon (1777-1859) the equestrian bronze statue of William III. was set up in St, James' Square in the year 1808.

William Pitts (1790-1840) was a clever modeller, who produced many figures, groups, reliefs, and models for silver work, in which he was also an able manipulator. In Cavendish Square is a bronze statue of the Duke of Portland's third son, Lord George Bentinck, larger than life size, the workmanship of Thomas Campbell (1790-1858).

The greater number of bronze statues erected in public places of London during the present century were works by Westmacott and Chantrey. By the former, Sir Richard Westmacott (1775-1856), are the "Achilles" in Hyde Park, a figure almost copied from one of those antiques on the Monte Cavallo at Rome, known as Castor and Pollux; a statue to the Duke of Bedford in Russel Square; of Charles James Fox in Bloombury Square; and that to the Duke of York, surmounting the column at the Carlton steps. The statue of Canning, in the New Palace Yard, Westminster, was the work of his son, Professor Westmacott, R.A. By Sir Francis Chantrey (1781-1842) are the bronze statue of William Pitt in Hanover Square; the ill-conceived equestrian statue of George IV. at the north-eastern angle of Trafalgar Square, and that of the Duke of Wellington at the Royal Exchange.

Patrick McDowell, R.A., of Belfast (1799-1870) was an able artist; by him are the bronze statue to the Earl of Belfast, erected in that city in 1856, and one to Viscount Fitzgibbon, at Limerick, in 1858. He produced some other works in bronze for the Houses of Parliament, but his marble group, emblematical of Europe, at the base of the Albert Memorial, is perhaps his most important work. The figure of Thetis, a bronze, was the work of William Theed, R.A. (1764-1817), who executed various models of groups, vases, &c., for Messrs. Rundell and Bridge, the silversmiths, working for them during tho course of fourteen years, and exhibiting at the Royal Academy. Ed. Hodges Baily (1788-1867), a pupil of Flaxman, was also employed by that firm as chief modeller. An equestrian statuette of George IV., at Windsor Castle, was probably his work. He subsequently produced the "Eve" in marble, and other well-known figures and monuments in the same material. The statue of the Duke of Kent, at the top of Portland Place, was by Sebastian Gahagan, about 1830.

The equestrian bronze statue to George III., in Cockspur Street, was the work of Matthew Coates Wyatt (1777-1862), and, although open to criticism, is not without merit. By him also was the ungainly—if not worse than ungainly—equestrian statue of the Duke of Wellington,* which surmounted the arch at Hyde Park Corner. This colossal figure, important for its size and weight, was begun in 1840, and was the work of three years; over 100 tons of plaster were used for the model, etc. It is formed in about eight pieces, screwed and fused together, and weighs some forty tons. The dimensions are—nearly 30 feet in height; girth of the horse, 22 feet 8 inches; length from nose to tail, 26 feet; length of the horse's head, 5 feet; of each ear, 2 feet 4 inches, It was erected in September, 1846, at a cost of about £30,000. Would that the shades of Verrocchio and Leopardi had inspired the mind and directed the hand that modelled at such cost a group so grand in its heroic subject, so abounding in material and means of execution!

The bronze statue of Lord Herbert, with the bas-reliefs upon its base, by Foley, erected in front of the War Office in Pall Mall, is an able work. So also is that to Sir John Franklin, in Waterloo Place, by Noble. That to Sir H. Havelock, in Trafalgar Square, by William Behnes, cannot be considered as successful, nor can the statue of Sir Charles Napier, on the same unfortunate site, doomed by the fates to modern artistic catastrophe; this last was the work of Adams.

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* Now removed [Ed.].

Central here, but in discord with its various surroundings, rises the Nelson column, noble in dimensions and boasting a brazen capital, while on the four faces of its base are *rilievo* representations in bronze of events in the great hero's life; northward, the battle of the Nile, modelled by W. F. Woodington; southward, the death of Nelson at Trafalgar, by C. E. Carew; eastward, the bombardment of Copenhagen, designed by Jernouth; westward, the battle of St. Vincent, commenced by Watson and finished by Woodington. The figures are of life size, the metallic weight five tons. At the four angles are couching lions, modelled by Sir Edwin Landseer, and cast in a mixed metal said to be bronze; but neither as models nor in beauty of surface or execution do they partake of those qualities that are characteristic of the capabilities and excellences of bronze as a vehicle for sculpture.

Vast in dimensions, material and cost, thank-offerings of a willing and grateful people to the memory of our greatest modern heroes, those two huge monuments to Wellington and Nelson, not executed in momentary haste, but tardily, are small indeed, and painfully deficient in the one most needful quality, artistic worth.

Why did the Spirit of Creative Sculpture stand coldly by, nor lend her aid for such exalted themes, adding untold value to the nation's gift by the immeasurable and deathless stamp of genius? She could not have been there! Our mechanical and manipulative faculties, well exercised and trained, were ready for the casting and execution of the metal-work, but the master artist, so longed for, was sought in vain.

Nor is the "Guards' Memorial," in Waterloo Place, designed by Bell—a group of guardsmen among trophies of cannon, etc., over whose heads Fame or Honour flings away coronals, all in bronze upon a granite pedestal—worthy of the brave soldiers it records.

Let us hope that the fine Gothic memorial to Albert the Good may mark the period of a new *renaissance.*

Colouring Amber.

For colouring amber it is necessary to find a liquid in which the amber can be heated, and this liquid must fulfil, says Prof. Ed. Hanausek, the following conditions. Its boiling-point must lie above 150° C. (302° Fahr.), and it is better if it boils above 200° (392° Fahr.). The amber must not be attacked by the hot liquid, nor must its physical characters be changed. The liquid must be able to dissolve dyes and not decompose them, or at least not rapidly. It should also be mentioned that the dyestuffs employed must not decompose at 150° or 200° C. Many of the fatty or essential oils, and also solid fats and hydrocarbons which melt below 150°, may fulfil these conditions. The attempts to impart different shades of colour to amber were made with linseed oil. The following pigments dissolve in it without being entirely decomposed at 200° C., viz., dragon's blood, alizarine, purpurine, and indigo. Of the aniline colours, fuchsin, aniline violet, methyl green, and alkali blue, all refuse to dissolve in pure linseed oil. In carrying out the experiment a weighed quantity was stirred into linseed oil, and the piece of amber to be coloured suspended therein, and slowly heated to 190° or 200° C. The liquid was then kept for some minutes at the temperature of 180° or 200°, after which the source of heat was removed and the hot liquid allowed to cool gradually. After taking the amber out of the oil and cleansing it, it was found to be dyed.

Different colours can be obtained with the above-mentioned dyes, and various shades can be produced according to the relative proportions of dye and oil.

A light or dark reddish brown can be made with dragon's blood, bright yellow with alizarine, an orange yellow with purpurine, light or dark green, dark blue, and black from indigo. The proportions of indigo that must be taken to obtain the shades mentioned are given as follows: For light green, one-fourth of a part of indigo to a hundred parts of oil; for dark green, half a part to a hundred; for dark blue, one part of indigo to a hundred; and finally for black, four or five parts of indigo to a hundred of oil; on heating the oil, the indigo dissolves in it and imparts to it a very beautiful reddish purple.

By frequently heating these mixtures to 200° C., both the indigo and the linseed oil suffer some change. The oil gets thicker and turns brown, and when heated it no longer assumes such a fine purple colour. A mixture that has undergone this change from heating, colours amber brownish; hence when it is desired to obtain pure shades of green and blue, it is necessary to frequently change the dye baths or renew them. In dying black this is not so necessary, yet it has also been observed that in this case, too, the operation succeeds better by using fresh dye baths, or at least adding a little unused indigo to the bath after each heating. In dyeing black it is not necessary to suspend the amber in the liquid, for it is coloured more quickly when it lies on the bottom in immediate contact with any undissolved indigo.

If finely pulverized asphalt is put in linseed oil, and the oil heated until it almost boils, a portion of the asphalt will dissolve, forming a brownish liquid and have a distinct, green fluorescence. Amber that has been heated in this liquid for a long time to 200° C. aquires a brownish colour and has a slight greenish fluorescence. This fluorescence is however, much more distinct and striking if the amber is subsequently heated in a mixture of one part of indigo in a thousand of oil.

Asphalt is not the only substance that can be employed to impart this fluorescence to amber, as all hydrocarbons which are fluorescent themselves can impart this quality to amber.

Colouring amber is of practical interest in as far as it is a fact that this crude material can have the colour changed in every way.

If it is found possible to give to any amber the colour and shade of the finest quality, great results may be expected. Moreover, the method of dyeing low-priced amber is so simple, that it can very easily be changed to black amber, for example, which is capable of being used for certain purposes.

Rendering amber fluorescent may be of considerable importance.—*Neueste Erfindungen und Erfahrungen.*

Nickel Plating on Zinc.

By Prof. H. Meidinger.

Successful electroplating in general depends upon three conditions: on the quality and properties of the metallic solution (the bath), on the strength of the current, and its relation to the surface of the pole, which determines the thickness of metal deposited in a unit of time (rapidity of precipitation), and on the nature of the surface of the pole on which the metal is to be deposited. If the pole is of metal and is to be inseparably united with the deposit, as is the case with silver plating, the surface must be perfectly clean and free from oxide or grease. If the surface is dirty, the precipitate peels off. It will not adhere at all to non-metallic substances, but merely incloses it.

It is a fact worthy of attention that under otherwise similar conditions many metals do not take certain deposits well. In some cases the deposit is streaked, powdered or of bad colour, and in others it peels off afterwards when polished. Iron in its different forms (steel, wrought iron, or cast iron), zinc, lead, and tin cannot be readily silvered or gilded in the cyanide bath, although it works first rate on copper and its alloys, and is generally used for that purpose. But of the copper alloys German silver causes more difficulty than brass. Copper, brass, and iron are easily plated in the nickel bath; zinc, on the contrary, is not. In some of these cases the metal to be plated acts directly on the solution itself, as, for example, zinc acts on silver and nickel solutions, and this circumstance may affect the properties of the whole deposit; this does not happen with iron.

If a metal cannot be nicely plated in a bath, it is customary to cover it first with some other metal of better quality in this respect. Thus iron, zinc, and tin are easy to silver and gold plate after they have been copper plated, and zinc can also be nickel plated under these conditions.

To unite the deposit as firmly as possible with the object, it has been found in many cases advantageous to slightly amalgamate the surface of the metal to be plated, especially in giving a thick coating of silver to instruments. The method is extremely simple, for it is only necessary to dip the articles for a short time into a mercurial solution and then rinse them with water.

The quantity of mercury used is insignificant, in fact a heavy amalgamation must be avoided as it would make the metal brittle. A mercurial solution serviceable for this purpose is made with the commercial mercuric nitrate or chloride (corrosive sublimate). The solution must be very dilute, about one, five, or at most ten parts of the dry salt in a thousand parts of water; to this solution some sulphuric or chlorhydric acid is to be added until the liquid is perfectly clear. The stronger solution gives up more mercury in a given time than a weaker one, and this must be taken into account in amalgamating. With practice it is easy to tell from the change of colour when enough mercury has been deposited. Iron does not alloy, or only very badly, with mercury, and hence it cannot be subjected to the process just described.

Within the last decade nickel plating has reached an extraordinary development. At first it was limited to iron, then it was gradually extended to brass and German silver, and now is increasing in favour for coating zinc. As this metal takes the nickel from ordinary baths very badly, it has been proposed to copper-plate it in the cyanide bath. But this is a nuisance. The use of the poisonous cyanide bath should be avoided as far as possible, and limited to cases where it cannot be dispensed with; in nickel plating, cyanides are not absolutely necessary, even if an intermediate layer of copper is desirable in thick nickel plating. The cyanide of copper (and likewise brass) bath has a disagreeable property of only working when certain conditions are exactly observed; it also decomposes easily. As the nickel wears off by use the red shines through, which is worse than if the white zinc itself were laid bare. Experience also showed that coppered zinc, when it came into the nickel bath, at once turned black and could not be plated.

There is not yet any literature on amalgamating zinc for the purpose of nickeling it. On many sides objections are heard against the deficiencies of the customary process of nickel plating, and it seemed to me worth while to make some experiments in this direction. The experiments were satisfactory. I amalgamated a sheet of zinc and then had it nickel plated by Schwerd in Carlsruhe. The nickel adhered well, united perfectly, and took a fine polish. I think it is not improbable that the nickeled sheet-zinc of commerce is prepared in a similar manner. This supposition receives support from one of the properties of this zinc to which my attention was called by Beuttenmüller, who has used a good deal of it in his factory.

It is rather brittle in comparison with pure sheet-zinc. I cannot explain this brittleness in any other way than due to amalgamation. The alloys of mercury with solid metals, called amalgams, exhibit this property, that the mercury dissolves off small quantities of the metals to form a thicker liquid; with a larger excess of the solid metals the alloys are solid, but fragile and brittle. This character remains, but grows gradually less. When a sheet of metal is amalgamated, it depends on the quantity of mercury combined with it and the depth to which it penetrates, whether it will cause a perceptible change in the strength of the metal.

Copper must remain in contact with mercury for a long time until it has penetrated a considerable depth; with zinc this takes place very rapidly. A sheet of zinc one millimeter in thickness, thoroughly cleansed in acids, only needs to have metallic mercury poured over it so that it forms a bright mirror to make it so brittle that it will not stand bending. Zinc carries this peculiarity into its alloys with copper, so that brass and German silver are much more sensitive to mercury than copper. If zinc is immersed in a mercurial solution, it will depend upon the time it stays in whether the mercury will be merely deposited upon the surface or will penetrate more deeply into the zinc. A concentrated mercurial solution will make a sheet of zinc one millimeter thick brittle in a few minutes.*

The quantity of metal necessary for nickel plating will have an imperceptible influence on its strength if the zinc is thick; but if it is thin it may show a perceptible difference, which makes it difficult to work the zinc. Special care must be taken to prevent too much mercury being deposited on the zinc by leaving it in the solution too long. The exact quantity can only be determined by experiments that are simple and easily carried out.

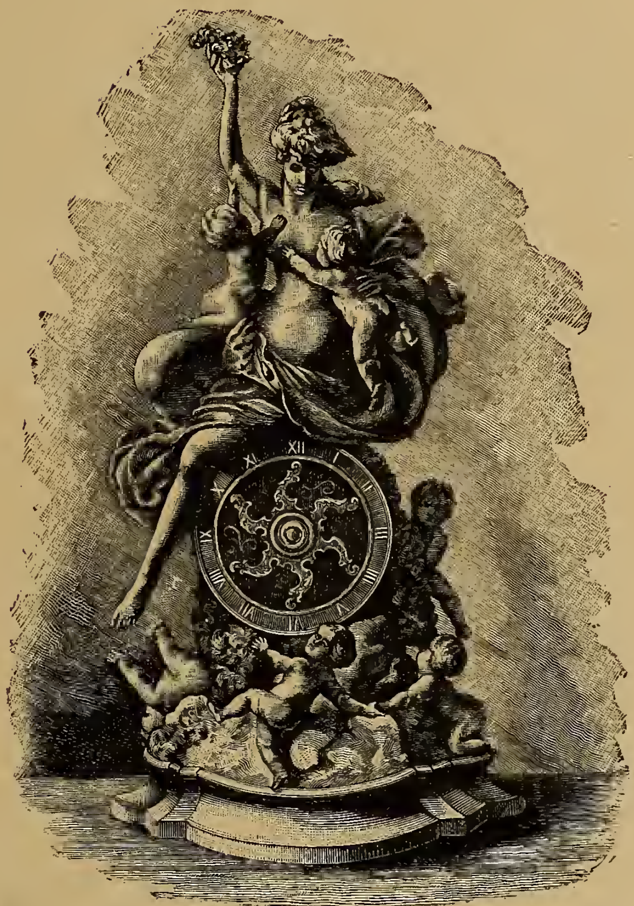
When one metal is deposited on another by the galvanic current, we cannot speak of them as alloys if they are inseparable, for they are only held together by adhesion. Hence there can be no change in the characters of the two metals; neither a harder nor a more brittle product results from electro-plating. If the latter is observed, even in a slight degree, it is easy to conclude that there is mercury in it.

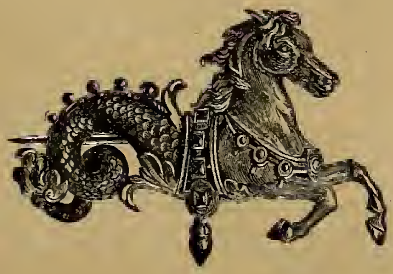
Pure zinc has a different action on nickel solutions from amalgamated zinc. The former soon turns yellow and brown, and the deposit can be rubbed off with a piece of paper. If a feeble current is employed this chemical action preponderates, and hence we obtain a poor deposit. If the current is very strong, the zinc will be more rapidly coated with nickel by electrical action than it would by the chemical action of zinc on the solution, and a good deposit can be obtained. It is only by observing these precautions that it is possible to nickel plate zinc directly, and yet this is frequently inconvenient. If amalgamated zinc is dipped into a nickel solution, after a long time feeble action will begin. The mercury, although there is so little of it, protects the zinc against the action of the liquid, like zinc in its alloys with copper, brass, etc., is protected against the attacks of different liquids, copper sulphate, sulphuric acid, etc. Yet in all these cases the protection is incomplete; after a while a slight action is observed. In nickel-plating zinc, slight amalgamation will suffice to secure a good deposit with a feeble current.

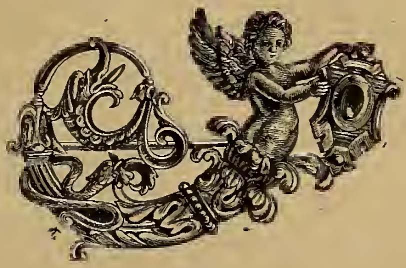
It has been observed that some kinds of German silver take nickel badly; previous amalgamation may, perhaps, be an advantage here, too.—*Badische Gewerbe Zeitung.*

Supplement to the Watchmaker, Jeweller, and Silversmith, February 1st, 1884.

MONTHLY SUPPLEMENT OF DESIGNS.







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ILLUSTRATED SUPPLEMENT:—"Designs for Modern Jewellery."

The German Horological School at Glashütte, Saxony.

By many queries addressed to me, I conclude that some exhaustive communication on the plan and system of our school and the best way of using it, might be welcome to many of your readers. I therefore would be much obliged to you for bringing the following statements before the public:—

Extract of the Regulations of the School.

1. The school receives young men who are desirous of acquiring the art of Horology or improving in the same.

2. The instruction afforded by the school is theoretical and practical.

3. The practical exercises of the attendants consist in completing and improving their own tools, making models of escapements and apparatus for the illustration of certain horological problems, making various parts of movements in connection with the watch manufacture of our place, making astronomical clocks and marine chronometers, timing and adjusting fine watches, constructing and calculating horological mechanisms of all kinds, etc.

4. Besides this, the school can provide thorough instruction in making and improving watch jewels, repeater work, lever escapements, and compensation balances, by renowned specialists. The school is also prepared to make its attendants acquire a practice in the latest attainments in electro-mechanics.

5. The theoretical instruction involves:—Arithmetic, Algebra, Geometry, plane and spherical Trigonometry, analytical Geometry, the Elements of Differential and Integral Calculation, Drawing, Natural Science, Mechanics, Theory of Horology, the elements of Chemistry, Book-keeping, French and English Languages. All the theoretical instruction is kept in intimate relation to Horology.

6. The time devoted to theoretical instruction is two hours a day as a maximum. All the rest of the day is filled by practical occupations.

7. The regular yearly course of instruction begins with the 1st of May, and with respect to the theoretical studies it is advisable to enter at this time. However, attendants are received at any other time, and if they cannot be assigned to any theoretical class, they are instructed only in practical work and in drawing.

8. The school can be used in different ways, and we distinguish in this respect:—

(*a.*) *Apprentices.*—Which are those attendants not having any practical attainments in our trade or not having practised in it for at least two years. They have to engage themselves for a stay of three years.

(*b.*) *Scholars.*—In this quality the school admits young men who have been practising in our trade during two years at least. They enter for a stay of one year, which may be prolonged at liberty.

(*c.*) *Guests.*—Those who have been practically employed in our trade more than four years are received for a stay of six months at least. As a rule they do not attend to theoretical lessons, except drawing.

(*d.*) *Hearers.*—These are young men sojourning here and attending merely to theoretical lessons or to drawing classes.

9. The categories under *a*, *b*, and *c* are submitted to the discipline and regulations of the school.

10. The school fee is to be paid quarterly in advance. Every attendant of the categories *a*, *b*, and *c* is bound to pay the school fee for the full extent of his obligatory stay, if there are no forcing motives for a premature leaving.

11. The school fee for apprentices and scholars who are subjects of the German Empire is 180 marks (20 marks = £1) yearly. For guests it is 150 marks (£7 10s.) for the obligatory six months and afterwards 18 marks a month.

12. These amounts increase by 20 per cent. for attendants of foreign nationality. This must not be considered an unfriendly or prohibitive measure. The expenses of the school are by far higher than the income by the fees. The balance is established by a subvention of the Government of Saxony and a contribution of the German Watchmakers' Union. If, therefore, an attendant of foreign nationality pays 20 per cent. more, he is still far from covering his share of the expense.

13. The work done by the attendant is his property, and if it consists in repairs, etc., the value of it is put to his credit.

14. A special class is arranged for repairing. Here, as far as the school is provided with work of this kind, the attendants are instructed in replacing or improving escapements of lever or detent watches, parts of complicated mechanisms, etc.

15. Every attendant must have his own set of tools, Anything required for this purpose may be had here in good quality and at moderate price under the control of the school.

16. A note containing the estimation of diligence and progress in the different branches of instruction is given to each attendant at the close of each quarter. Those who have filled their obligatory term receive a certificate on leaving the school.

To the above extract of the regulations I wish to join some explanatory remarks.

Any young man coming here to attend our school ought to be steady in his habits and diligent, so as to make the best of his stay for his own interest and for the credit of the school.

Those who have decided for the watch and clock-making trade had better enter as apprentices. No private workshop can afford the same facilities in practical and theoretical instruction as a school exclusively devoted to this purpose.

The council of the school is prepared to accommodate young men in board and lodging with respectable families of our town at the price of 40 to 50 marks a month.

Thus the yearly expense of a young man here runs about as follows:—

School fee (yearly)	216m.
Board, Lodging, Washing, Heating, and Light	660m.
Clothes, Books, Pocket Money, and Sundries...	124m.
	1,000m.

From this amount may be subtracted the value of his work.

For those who are coming here without any tools it will require 300 to 500 marks to fit them out, but this sum is not wanted at once.

Those who could not afford the above expense, would, if they are competent practical workmen, attain their purpose as nearly as possible by taking a situation in one of our manufacturing houses and attending to the theoretical lessons. Then they will earn for their work what it is worth here and thus defray part of the expense. I am quite willing to assist them in these endeavours.

There is certainly a difficulty to be overcome for those who do not know the German language. We receive scholars without any knowledge of our language, but in their own interest I would advise those intending to come here to learn as much of the language as they can beforehand, as it will prove a great convenience and advantage to them in their studies here. Boys who are willing to enter as apprentices ought to be sent, if possible, to a good school at Dresden to complete their general instruction and at the same time acquire the language thoroughly. If, *f. i.*, a boy of 12 or 13 years, instead of finishing his school-time in his country, was sent to a good school at Dresden or some other German town, it would prove a very good plan. There are many American and English lads in German boarding schools, and I am quite ready to recommend a good school and to settle the preliminaries.

Those who come here without any knowledge of the German language had better come six or nine months before the beginning of the regular course (1st of May), so that they can acquire the language by private lessons sufficiently to follow the theoretical lessons.

The climate of our place and district is very healthy and similar to that of Northern England. Glashütte is situated in the valley of a small river at the foot of the high mountains separating Saxony from Austria (Bohemia). Gymnastic exercises and pedestrian excursions establish the necessary bodily development.

Saxony is a Protestant country, but places of Catholic and Israelite worship are not far from here.

The school building is very well adapted for its purposes, The working and teaching rooms are spacious and well lighted. The school is now in the middle of its sixth year of existence. Last year it has been visited by fifty-six attendants without the "hearers." Of this number eleven were from foreign countries.

I wish to add some words about my personal relation to our school. By numerous queries received, I see that it is generally believed that the school is my private enterprise and belongs to me. This is an error; the school has a public character, and I have not the slightest material or financial interest in it. I am carrying on my watch manufacturing business as before, but since the foundation of the school I have been entrusted with the presidency in the Council of the school and with the general superintendence of it. All communications bearing on reception of scholars, etc., ought to be forwarded to me.

Address; M. Grossmann, Watch Manufacturer, Glashütte, Saxony.

Glashütte, Saxony, February, 1884. M. Grossmann.

* * *

"The Manufacture of Watches at Home and Abroad."—The Editor has been requested to read a paper on the above subject on Friday evening, the 21st inst., at 8 o'clock, at the usual weekly meeting of the Balloon Society of Great Britain, held at the Royal Aquarium, Westminster. Office, 26, Budge Row, Cannon Street, E.C.

The Manufacture of Repeating Watches.

(From the *Journal Suisse d'Horlogerie.*)

(*Concluded from page* 113.)

A "perfection" recently introduced in minute repeating works is the detaching mechanism of the jumping-piece (*sautoir*) of the surprise, which has the effect of taking off the drag occasioned to the large train by this jumping-piece. Before its employment, the examiner had to carefully diminish this drag, by limiting the descent of the jumping-piece, and leaving the spring just strong enough to ensure its action. The detachment is applied by two methods: in the first place, by leaving a light contact of the surprise with the point of the jumping-piece, when the rack, entirely brought back, has made it recover its position; this touch is necessary in order that the surprise may be pushed behind at the moment, where, in striking from twelve to thirteen minutes after each quarter, it should be able to hinder the minute-piece from falling on the snail, as it is this which causes the hand to move back. In the second place, the examiner can also adapt in the thickness of the quarter snail, a spring acting against the nut which is adjusted to move stiffly on the cannon pinion, so as to keep the snail and the surprise behind, under the minute snail till the moment when on each quarter the jumping-piece pushes them forward, from which it results that the quarter-piece falls on the following notch, and that of the minutes on the surprise or zero minute.

The employment of this spring offers two advantages: it allows the jumping-piece to be completely detached, and prevents the piece from going back when the hands are turned back after each quarter without arriving at the point where the jumping takes place.

This spring of the snail ought to be weak enough for those of the jumping-pieces of the star and of the surprise to overcome it with certainty. At one o'clock, and at the moment of changing on the points of the quarters, the jumping-piece ought to make the surprise advance all the way that the opening permits in which the pin passes, which is fixed to the minute snail; for that, the leaf-shaped piece, below the jumping-piece, ought not to be too much hollowed out near the point.

The jumping of the star from twelve to one o'clock ought to have taken place a little before that of the surprise; without that, the jumping of the surprise might have been effected while the push took place for striking, and when the arm of the rack had already passed before the high part of the snail corresponding to one o'clock, the piece would strike twelve o'clock without quarters or minutes, when it ought to have struck one.

Verification of the Actions, and Putting on the Other Parts.

The putting in action of the dial and repeating work being finished, the spring applied, and the piece set going, the correctness should be verified by making it strike many times a little before the hours and quarters. Just at the moment that the minute hand has passed the points, the examiner must assure himself that these changes operate exactly, without the hand making any movement, when the quarter or the five-minute piece falls on the snail or the surprise. If he observes a forward movement, it will be expedient to weaken the springs of the said pieces, and also those of the overswinging of the levers of the hammers, of which they ought to overcome the resistance, even when these pieces arrive without drop on the notches of the snail. If, on the contrary, it produces a backward movement of the hand immediately before the jumping on the hour, this should indicate that the arm of the quarter or five-minute piece touches in falling against the snail; this or the arm should be filed, in such a manner that it may have a sufficient space for safety at the moment when the star is ready to jump.

It should be ascertained that the edges of the notches of the snail as well as the end of the arm are correctly filed, so as to leave the angles sharp. If, after these re-touches, the minute hand will not remain fixed when the piece is struck at the moment of changing on each quarter, the burr on the arbor of the cannon pinion must be strengthened, to make it fit tighter in the centre pinion.

After having put the hands at their definite height, the glass and the glass in the dome (if there is one) should be fitted, and then the piece should be dismounted to make the corrections of which note has been taken, and to prepare the different parts of the movement for the engraving, gilding, stoning, polishing the screws and the other steel pieces. It will be well to mark the snail with the cannon pinion, to the five-minute and minute pieces, as well as certain screws, and to mark the position of the barrel of the small train, to set up the spring the same quantity, when the movement is finally put together again.

If there is an inscription or a name to engrave on one of the bars, the direction of the letters should be taken while holding the pendant towards oneself.

To the movements with lever escapements it should be remarked if the balance comes in and out easily, and also if it is necessary to make an opening for the balance pivot on the edge of the hollow of the sink, and to thin the flat part of the escape cock.

Before sending the case to be prepared for ornamentation, the cover or the bottom should be raised if there is not space for the glass, the hole in the joint of the dome should be opened out, and the dome made to open a proper distance for it to remain outside the glass of the bottom of the case, and a point should be marked opposite the pendant, to indicate the direction of the inscription to the engraver.

When the different parts shall have been returned and examined, the bridge of the winder should be screwed on the plate, with the spring bar, the case screws and the studs of the minute wheel and the repeating work, then remount with great care the two trains and the escapement.

Put the slide on after having cleaned the band, and ascertain that the winder is entirely free, with the movement in the case, the screws well home.

The levers of the hammers, their springs, counter-springs, and adjusting screw will be remounted, and their actions verified, above all, taking care to put oil wherever it is necessary.

The examiner should be assured that the small train runs freely during the complete action of the spring; it should be afterwards stopped by the screw of the "fast and slow" (*vite et lent*) in order to easily be able to place the gearing of the pinion in agreement with the teeth of the rack, and to set up the spring the required quantity.

The other pieces of the repeating work will be replaced and their actions definitely verified.

Mr. John Huguenin then adds:—"Arrived at the end of the task that we have undertaken, we hope that the manufacturers of repeating watches will kindly address to the editor of the *Journal Suisse d'Horlogerie* some observations which they have made themselves, and which are not contained in this short study."

We hope that our readers will be able to gather a few useful ideas from the number of minute and, in some instances, tedious directions, which we have endeavoured to translate for our mutual instruction. Certain parts are undoubtedly obscure, and we have consulted several foreigners acquainted with repeating work without receiving any material assistance from them. Our own rule is to think a good many times before filing any part of a repeating work, as what seems perfectly straightforward and feasible to ensure one action may, if attempted, seriously affect another. A very useful part of the essay to which we would draw especial attention are the directions which are intended to obviate the risk of the hands moving at the moment of striking. This is a most insidious fault, and one that cannot be too carefully guarded against. The wearer does not always look at his watch while striking it, and may unexpectedly find it fast or slow, generally the latter, which means losing a train or an appointment. Mr. Huguenin has not referred to one matter of detail which we think important, and that is with regard to the regulation of the speed of running of the small train. It frequently happens that the minutes are given much too quickly, and when the brass adjusting piece or *vite-et-lent* is turned to make the depth deeper in the pinion the train sometimes stops. The only way of effectually correcting this is to "weight" the pinion by putting a piece of gold on the arbor. The depth can then be left quite free. Probably in Geneva a weaker mainspring would be applied, but it is well to avoid tampering with these springs, if possible. We regret that the art of making repeating mechanism has so completely left this country that a high price has to be paid for what are supposed to be perfectly correct movements, but they require many "*retouches*," as Mr. Huguenin would say; and the risk of doing these is intensified by the fact that any mishap with an important piece necessitates the entire watch being sent to Switzerland. We remember, years ago, experimenting with a "surprise," and having to send the movement away, after all.

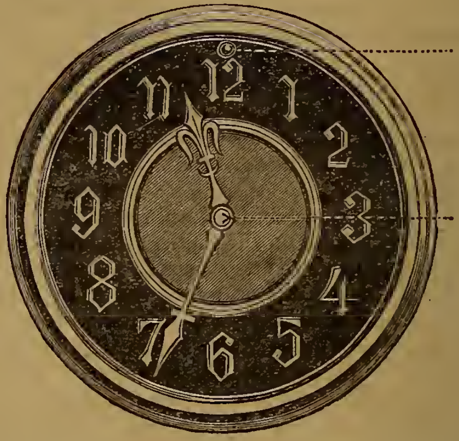
In spite of these drawbacks, however, "English" repeaters command the best markets, and there will always be employment for skilled workmen who are capable of handling them.

The British Horological Institute.

Mr. Arthur L. Perrett, who was awarded the second prize at the examination held at the Horological Institute in June last, has sent us a circular, headed "A Few Facts about the Awards of the Medals of the Horological Institute," the object of which is to demonstrate that he fairly won, and ought to have received, the first prize, which was taken by W. J. Barnsdale. He states that he has reason to believe that by some accident the wrong cover was put on the box which contained his escapement, and lays stress on the fact that he stood highest [after D. Glasgow, Jun., who was not a pupil] at the City and Guilds Institute examination; but as the result of this was not made public until August, it does not affect the justice of the decision of the Horological Institute judges. The point raised about the work being "mixed" is rather amusing. At the first presentation in 1881, a similar statement was made by A. J. Barnsdale, who refused to accept the second prize in consequence. It may perhaps seem mean, but we are thankful that we sent in our resignation as one of the judges, in consequence of undertaking the duties of Editor of this journal. Our opinion is that two of the judges should be chosen from practical men outside the Institute, and the work examined at their leisure; also that the pupils should undertake beforehand to accept the decisions as final, for these discussions do not tend to edification, and we think that "they manage things better in France." It is necessary for us to make these suggestions in our own columns, as some members of the council seem to regard the "editor of a rival journal" as an intruder.

Keyless Clocks.

Messrs. George Bendon & Co, of Ely Place, have recently patented an ingenious arrangement for winding clocks from the centre of the hands, as shown in the diagram. They designate them as their "New Patent Central Stem Winding Keyless Clocks," but this title is really more complicated than the mechanism, which is of the simplest description; and the central winding is accomplished by planting the "centre" wheel on one side as in a centre seconds movement. The motion wheels act on a pipe, down which the winder, which always remains in the clock, is inserted. At the bottom of this pipe is a wheel, with a square hole, and the end of the winding shaft is squared into it. This wheel gears with two larger ones, fixed on the arbors of the barrels of the going, and striking, trains, and the action of winding is alternated from right to left, exactly the same as in keyless independent centre seconds, and clock watches. The chief thing we have to find fault with is the price, as a complete clock can be supplied for less than the cost of the keyless mechanism for a first-class fusee watch, and it is a marvel how they can be produced. Still there they were and in great variety of styles and sizes. Should they answer the expectations of the patentees, Sir John Bennett's notice of "No more watch keys" may be extended to clocks.



Ancient Gems and Gem Engravings.

By James Prendeville.

Of all the remaining monuments of the ancient arts, which have been a source of universal and unmixed delight, admiration, and instruction to succeeding ages, there are none so various in their objects—so pleasing in their contemplation—and so useful in their study, as the *engraved gems* and *seal-rings* of the ancients. They have preserved in palpable, durable, and almost living characters, the images and the attributes of the ancient mythology; and the features, conditions, and adventures, of the most illustrious personages. They exhibit the most curious details of ancient customs and religious ceremonies; often ingenious and moral allegories, displaying a rich and chaste imagination; while they are, at the same time, invaluable models and copies of the most beautiful pieces of ancient sculpture. Thus, according to the unanimous testimony of all writers, ancient as well as modern, on the subject, they preserve for the amateur the finest copies of statues and groups—for the antiquary, the manners and customs of the ancients—for the historian, remarkable events—for the painter, his finest studies—and for the poet, numerous and diversified images.

As these gems were engraven on the most solid substances, and were in general carefully kept, they have not suffered, as statues and pictures have, alteration or injury by time; and are the only specimens of ancient ingenuity and skill that have been transmitted to us in their original freshness, beauty, and perfection. Uniting to the beauty and the value of their materials the merit of the most exquisite execution, they make us admire the wonderful perfection of an art that appears, by the delicacy and correctness of the workmanship, to rival the skill and industry of Nature in the beautiful formation of the minutest animals—as the learned Hayley thus well expresses this whole subject:—

> "As *Nature*, joying in her boundless reign,
> Adorns the tiny links of beauty's less'ning chain;
> Her rival—*Art*, who emulation warms,
> Loves to astonish by *diminished forms*;
> And the consummate characters to bring
> Within the compass of the costly *ring*—
> Delightful talent of the patient hand,
> Gaining o'er life such delicate command!
>
> . . . .
>
> The heroes of old time were proud to wear
> The *seal*, *engraven* with ingenious care.
>
> . . . .
>
> To this fine branch of *Art* we owe
> Treasures that grandeur may be proud to show
> Features of men who on Fame's list enroll'd,
> Gave life and lustre to the world of old—
> Worthies, whose STATUES *failed Time's flood to stem*,
> Yet live effulgent in the *deathless Gem*."

Sculpture in its various departments (and gem-engraving was one of the most prized and important of these departments) had a powerful influence over the tastes, habits and emotions of the ancients—especially of the Greeks. While it was a record of the religion, the military glory of the people, and the celebrity of individuals, it generated a high tone of religious feeling, a martial spirit, and a rivalry for fame. Their divinities they saw portrayed with their most imposing attributes—their heroes in their most perilous enterprises—and their good men in their most trying sufferings. Having seen all this, they were occasionally warmed into a high sense of religious insensibility and of devotion—roused into warlike courage, or softened down into humanity and pity. Suetonius says that, when Julius Cæsar saw in the temple of Hercules, at Cadiz, the statue of Alexander the Great, he wept at his own comparative inactivity and obscurity; and prayed for an opportunity of winning such glory. But statues were chiefly memorials for public exhibition in the great halls and the temples—seen but comparatively by a few; whereas engraved gems, recording the scenes, the ceremonials, and the achievements portrayed by the statues, were in the possession of every family, and kept alive the emotions of religion, of patriotism, and valour.

Cicero has observed that necessity may be considered as the primitive parent of all those arts which have instructed and charmed mankind; for it produced those inventions that tend to our use, and minister to our wants; and those, when cultivated with diligence and skill, progressively rise to improvement and refinement; and thus are produced those inventions that tend to our edification, and minister to our intellectual luxury and pleasure. "The origin," says Raspe, "of engraving cannot with exactness be traced to any definite period, or to any particular people, for its first mechanical rudiments—*i.e.*, the art of grinding, polishing, and shaping hard stones—was certainly taught by necessity to many tribes of savages who never had intercourse with each other. Military weapons, domestic and mechanical vessels and implements, of various forms and for various uses, made of flint, porphyry, jasper, and other hard stones, often curiously cut, polished, and perforated, have been found alike in the sepulchral monuments of the most ancient barbarians of Europe and Asia, and dug out of fields which were the scenes of battles in very remote and uncivilised ages. Hence it is considered right to say of them, what Tacitus (*de Morib. Germ.* c. vi.) says of the ancient Germans—that they were unacquainted with the use of metals, which would have furnished them with better materials for tools and weapons. In several parts of the kingdom of ancient Mexico stone vessels and implements, worked with great care and elegance, have been also discovered. Weapons, utensils, and even *ornaments* of similar materials and workmanship, have been found among the South-Sea islanders; the execution of some of which (continues Raspe) is really astonishing. Such, in particular, is the excellence of an ornament formerly in the possession of Captain Cook, who, in his second circumnavigation of the world, brought it from New Zealand, where the chiefs wear such ornaments with as high an air of pride and dignity as our great men wear their stars and ribands. It is a singularly beautiful and transparent green stone, of a flinty yet muriatic nature, exceedingly hard, in colour between the emerald and the chrysolite; and of a cylindrical form, about ten inches long and half an inch thick, gently bent towards the upper end, where it is perforated to admit the string which fastened it to the ear of the wearer. Its uncommon transparency and polish make it, in its kind, and in the opinion of intelligent naturalists, as inestimably precious as any large diamond can possibly be, though perhaps not so valuable as an article of merchandise in the estimation of the mercenary. So that, considering the great hardness, high polish, and elaboration of the stone, it must have been a work of immense labour; and may, on that account, be looked upon as one of the greatest masterpieces of this first stage of the art of grinding, cutting, and engraving hard stones.

The origin of engraving on precious stones, cannot, I repeat, with any accuracy, be traced to any certain period of time; nor can the invention of it be ascribed exclusively to any one nation. But that it is an art of very remote antiquity, we have the most unerring evidence; for it is expressly mentioned in the oldest literary records in existence—the book of Job, and the Pentateuch, or the five books of Moses. There is a high degree of probability that, as Strut intimates, it was known before the Deluge; for we find in Genesis (chap. iv.), that Tubal-Cain, the son of Lamech, was "the *instructor of every artificer* in metals;" and it is likely that, as his descendants multiplied, the art was carried to no mean order of excellence. Now the use and artificial application of metal tools was confessedly subsequent to the working of stones; for though one hard stone may be polished, cut, and shaped for use or ornament by another, yet metal tools were necessary in general to give a perfect execution to the engraving. Be this, however, as it may, we find in Genesis, that Judah gave Tamar his *signet* and his *bracelets*; and that Pharaoh took off his *signet-ring*, and placed it on the finger of Joseph. And Judges (xviii.) in the house of Micah there was a *molten* image and a *graven* image; and in Job we find this passage: "Who shall cause my name to be hewn out with a *graving-tool of iron* in the *rock* for ever." Now all signet-rings were engraved, and had some device or inscription. But the most important and decisive passages in the Old Testament in proof our position are those in Exodus, where Moses mentions *engraved gems* as constituting an essential and prominent part of the habiliments of the Jewish high-piest.

The ephod and pectoral or (breastpiece) were principal parts of the garments of the Jewish high-priest, when officiating. The ephod was a sort of sash, passing over the neck and shoulders, and drawn backwards round the body, and then drawn to the front, acting as a girdle to the tunic. Exod. ch. xxviii.: "And they shall make the ephod of gold, of blue, of purple, of scarlet, and fine twisted linen, with curious work. . . . And thou shalt take two onyx stones, and *grave* on them the names of the children of Israel: six of their names on the one stone, and six names of the rest on the other stone, according to their birth. With the *work of an engraver in stone*, like the *engravings of a signet*, shalt thou engrave the two stones with the names of the children of Israel: thou shalt make them to be set in ouches (*i. e.* sockets) of gold. And thou shalt put the two stones upon the shoulders of the ephod, for a memorial to the children of Israel."

The pectoral, a piece of many-coloured, fine-twisted linen, about 10 in. square, was fastened to the ephod, where it crossed the breast. "And thou shalt make the breastplate of judgment with curious work, after the work of the ephod shalt thou make it. . . . And thou shalt set in it settings of stones, even four rows of stones: the first row shall be a sardius, a topaz, and a carbuncle; the second row shall be an emerald, a sapphire, and a diamond; the third row an agate, a ligure, and an amethyst; and the fourth row a beryl, an onyx, and a jasper; and they shall be set in gold in their enclosings; and the stones shall be with the names of the children of Israel, twelve according to their names, *like the engravings of a signet.*"

Ch. xxxv. Bezaleel and Aholiab were the engravers: "And Moses said unto the children of Israel, See, the Lord hath called by name Bezaleel, the son of Uri; and hath filled him with the spirit of God, in wisdom, and in understanding, and in knowledge, and in all manner of workmanship; to devise cunning works, to work in gold, and in silver, and in brass, and in the *cutting of stones to set them*, and in the carving of wood, to make any manner of curious work. And he hath put in his heart that he may teach, he and Aholiab, the son of Ahisamach. Them hath he filled with wisdom of heart, to work all manner of *work of the engraver*, and of the cunning workman."

Some short-sighted critics take the words, "The Lord filled him with the spirit of God, in wisdom, and all manner of workmanship," and "Them hath he filled with wisdom of heart to work all manner of work of the engraver," in their strict and literal sense, to mean that God inspired them with a species of knowledge they did not possess before; and to imply that gem-engraving was before this time unknown to the Israelites; and therefore that these passages can determine nothing in favour of the antiquity of the art. Now this interpretation is at variance with the whole scope of the phraseology of the Old Testament, and with the explanations of the best biblical commentators, who say, that, in the language of the Bible, superiority of knowledge in any art or science which was generally in use among the people, is said to be the gift of God; and that the expressions here do not indicate the discovery of a new art, but are only a figurative mode, in the Oriental style, of mentioning Bezaleel's and Aholiab's surpassing accomplishment in a known art. Besides, I may add, that we find (as as been already stated) "*engraving a name in stone with a graving-tool of iron*" practised in the time of Job—a time long prior to this; that Moses mentions the signet-ring of Judah, which was presented to Tamar; and the signet-ring of Pharaoh, which was presented to Joseph, long before this time; and that before this time, he mentions Aaron as fashioning *with a graving-tool* the golden calf for the Israelites (Exod. xxxii.). Now, if we suppose with those critics that God inspired (strictly speaking) Bezaleel, who was before ignorant of the art—an art not known to the Jews—to work the ornaments of the ephod and breastplate of the high-priest; we must, by parity of reasoning, suppose that He also inspired the artist that engraved the signet of Judah, before the Israelites ever set foot in Egypt as a people; and Aaron to work and engrave the image for the Israelites, and so encourage them to idolatry, contrary to His own express wish and injunction!

(*To be continued.*)

◆

Apparatus for Automatically Winding Up Clockwork.

Invented and Patented by Nathan Silberberg, of Jassy, Roumania.

The object of this invention is the winding-up of clock-work by self-acting appliances or apparatus. The inventor utilises for this purpose the variations in length of a chain of metal bars, which variations take place during changes in the temperature of the atmosphere.

The self-acting appliances or apparatus employed consist essentially of a chain of metal bars arranged around the clock-work, and having one end firmly attached to the frame whilst the other end is attached to a winding drum. This chain is preferably constructed in the following manner, supposing the clock to be about seven feet high, that is to say:—Inside the glass case of the clock, and on two opposite sides of the frame of the clock-work a set of about thirty-five zinc bars are pivotted at their upper ends to a row of metal levers pivotted along the top of the said frame, and at their lower ends to a second row of metal levers pivotted along the bottom of the said frame. Each of the zinc bars may be about six feet long. One end, say the lower end, of the first zinc bar is fixed to the frame, while its other end is pivotted to one end of the first of the top row of levers. To the opposite end of the first of the top row of levers is pivotted the upper end of a second zinc bar. The lower end of the second zinc bar is pivotted to one end of the first of the bottom row of levers. The opposite end of the first bottom lever is pivotted to a third zinc bar, the upper end of which is pivotted to the second top lever, and so on, the end of the last zinc bar being connected to the winding mechanism. The total length of the chain thus formed will be about two hundred and fifty feet. It is therefore evident that very slight variations of temperature will produce a considerable variation in the length of the chain and a corresponding action on the winding mechanism connected therewith.

Any suitable arrangement of ratchet-wheels and pawls may be used for utilising the variations in the length of the chain for the purpose of winding up a weight in connection with the clock-work, and any suitable stop may be arranged for preventing overwinding.

The invention is illustrated in the accompanying drawings in which—

Figure 1 is a rear view of a clock, the back of the case being removed.

Figure 2 is a view showing the arrangement of the chain of metal bars.

Figure 3 is a side elevation of the clock case showing the metal bars.

Figures 4 and 5 show the winding mechanism connected to the last bar of the chain.

The chain forming the essential part of the self-acting appliance for winding up a clock consists of a number of metal bars *y* preferably of zinc, the ends of which are connected by metal beams or levers *f*. One set of the levers *f* is pivotted centrally at the top, and the other at the bottom of the clock case.

The metal bars *y* and the levers *f* form a chain the first bar *y* of which is fixed at its end 1 to the clock case, the other end 2 thereof, being pivotted to the end of the first lever f of the top row of levers. To the other end 3 of this lever is pivotted a second metal bar y leading down on one side of the clock case to one end 4 of the first lever f of the bottom row; to the other end 5 of the latter lever is attached a third bar y passing upwards on the other side of the clock case to one end 6 of the second lever f of the top row, to the other end 7 of which is pivotted a fourth metal bar y, and so on as indicated by the numbers 8, 9, 10 and 11 in Figure 2.

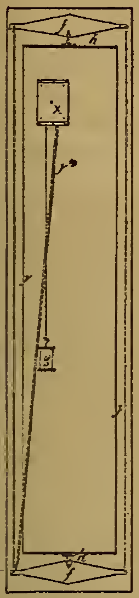


FIG. 1.

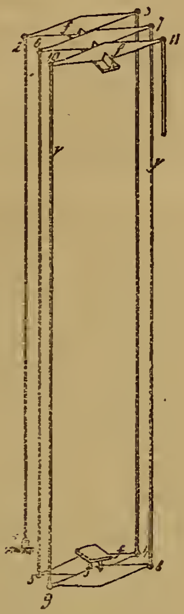


FIG. 2.

FIG. 3.

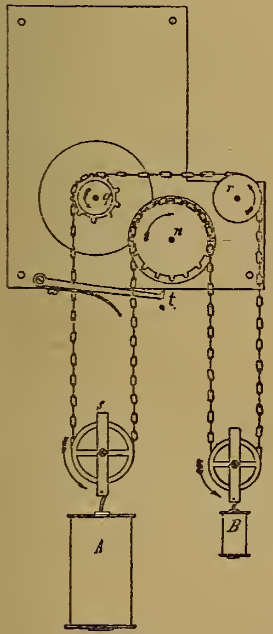


FIG. 4.

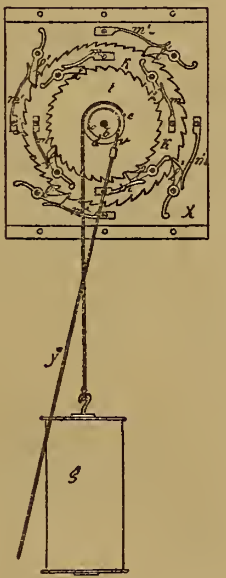


FIG. 5.

At any change of temperature, therefore, the extent of movement of the end of the chain which is free to move, is equal to the sum of dilatations or contractions of all the metal bars y. The last bar y^* of the said chain is connected to suitable mechanism by which the variations in the length of the chain are utilised for the purpose of winding up the clock.

In the arrangement shown in Figures 4 and 5 which has been found to give good results the bar y^* (Figure 5) is fastened to one end of a rope or chain v, the other end of which is connected with a point e on the circumference of the wheel b. Keyed upon the shaft of this wheel is a disc d, and to a point c on the circumference of the latter is secured one end of a chain or rope to the other end of which is attached a weight g.

The points c and e are on opposite sides of the common axis of the discs b and d. Keyed upon the common shaft of the said discs is a ratchet wheel i; between the teeth of the latter, pawls l, acted upon by springs m, are arranged. These pawls and springs are carried by another ratchet wheel k the shaft of which is concentric with the shaft of the ratchet wheel i but is loose on the same and projects out of the frame x of the ratchet gear fixed to the back of the clock case. With the teeth of the latter ratchet wheel engage pawls l^1 kept in contact with the said teeth by springs m^1 these pawls and springs are carried by the frame x.

The shaft of the ratchet wheel k is securely coupled to the shaft of the wheel n, (Figure 4), around which the chain or rope carrying the clock-weight A is wound, which chain passes as shown in Figure 4 round the wheel q of the clock work and besides round a small wheel r, and carries a small weight B which serves to keep the chain tight. The wheels n, q and r are preferably chain wheels.

The operation of the winding mechanism is as follows, that is to say:—When by increase of temperature the length of the chain of bars y and levers f increases, the end of the bar y^* (Figure 5) moves upward, whereby the weight g is allowed to fall (the chain v being slackened) turning the shaft of the wheel i, the pawls l now acting as a clutch cause the ratchet wheel k to rotate in the same direction, and as the shaft of this latter is coupled with the shaft of the wheel n this wheel will also be rotated so as to lift the clock weight A and wind the clock. The sum of the momenta of the weights g and B relatively to the axis of the wheels i, k, and n must exceed the momentum of the weight A relatively to the same axis, because otherwise the movement could not take place. In case the temperature should decrease the end of the bar y^* would move downwards, lifting thereby the weight g and turning the shaft of the ratchet wheel i in the opposite direction to that in the former case, but now the pawls l permit the wheel i to rotate freely and the pawls l^1 check the movement of the ratchet wheel k, thus preventing the wheel n from rotating and unwinding the clock.

It is obvious therefrom that any dilatation of the chain of bars and levers will be utilised to wind the clock but that no decrease of temperature and consequent contraction of the said chain will cause an unwinding.

The inventor does not however limit himself to the above described arrangement of the ratchet wheels, pawls, and the connection between them, and the bar y^* as many others might be employed without departing from the nature of this invention. Instead of utilising the dilatation of the chain the contraction may be utilised; and instead of pivotting the levers f upon knife-edges, as shown in the drawing other modes of pivotting the same may be used.

Any suitable stop may be arranged for preventing over-winding. The construction shown in Figure 4 has been found to give good results. It consists of a pawl t against which the block s of the weight A strikes when the clock is wholly wound, whereupon the pawl t engages with the teeth of the chain wheel n and thus prevents further winding up of the clock by checking the downward motion of the weight g, then in case of additional dilatation of the chain of bars y and levers f only the chain or cord v will be slackened.

The number and length of the bars y depends on the original length of time for which the clock is to run and on the dimensions of the same.

Patent Law Reform Fifty Years Ago.

Leges ad civium salutem, civitatumque incolumitatem conditæ sunt.—Cicero. (Laws were made for the safety of citizens, and the security of States.)

Legem brevem esse oportet quo facilius ab imperitis teneatur.—Seneca. (A law ought to be short that it may be the more easily understood by the unlearned.)

Reason is the life of the law; nay, the common law itself is nothing else but reason. . . . . . . The law, which is perfection of reason.—*Coke's Institutes.*

IN commencing this paper it will be as well to explain that the first authorities named above "flourished" about one hundred years before the Christian Era, whilst Edward Coke wrote his celebrated "Institutes" on the laws of England towards the close of the seventeenth century. From this it will be seen that we have a time-bridging of the Roman and English laws for something like eighteen hundred years. Here is at least a respectable antiquity to shake hands with, and we may sit down to the calm study of the subject of this paper with a philosophy drawn from such old world and noble exemplars. In this spirit let us proceed.

The scope of the new Act, so far as one has been able to learn in social conversation among various business circles, does not seem to be very clearly understood. It is intended by it to consolidate the law, not only of Trade Marks, but of Patents for Inventions and Registration of Designs. It came into operation on the 1st of January, and many persons had been anxiously waiting at the gates before they were opened; they can now enter and be thankful.

The Patent Laws have been the source and cause of much justifiable heartburning for a generation or more; but, practically, they are in the same condition at the present day as they were thirty years ago. How many times in the House of Commons, at conferences and special meetings have they been denounced? Even the Society of Arts went into "session" upon them and had lectures given from time to time. Before going into the particulars of the present newly born law, I believe that a glance at the state of this much vexed question within what may be called the time of manufacturers now living will be deemed instructive as well as interesting; at all events to most of us it will have the charm, though old of itself, of something new to the reader.

On the 9th of April, 1829, a motion was agreed to in the House of Commons for a Select Committee to be appointed to inquire into the present state of the laws relating to granting Letters Patent, and the Committee was appointed accordingly. How history and politics repeat themselves! That Committee examined witnesses at great length, but the members of it found that such was the intricacy and importance of the subject, they found themselves at the end of the Session in a condition only to report the minutes of the evidence which had been taken, both oral and documentary; and in their report they strongly recommended to the House that the inquiry should be resumed when Parliament re-assembled. The Committee had not been idle over their work, which was ordered by the House of Commons to be printed. The examination of witnesses commenced on the 8th of May, and comprising thirteen sittings terminated on the 12th of June. Some nineteen witnesses had been examined, and sufficient was obtained from them to fill 156 folio pages, whilst the documentary matter put in filled 1,000 pages more. Taking the extra matter that always forms part of these inquiries, there could not have been fewer than 1,200 of these very large pages of one portion only of the inquiry. It is most interesting to us of the present day to read now from the mouths of those witnesses of the several steps necessary for taking out a patent in those not very distant days. Inventors' minds were on the rack then quite as much as now about the fearful mazes and pitfalls of patent law. Here are the rungs of the legal ladder up which the hopeful patentee had to climb—and hold on well in the climbing.

1. A caveat may be entered at the Patent Office by the party about to apply for a patent, the effect of which will be to entitle him to have notice of any application that may chance to be made by another party for a patent in regard to an invention appearing to be similar to his, before his patent shall have been granted. The caveat costs fifteen shillings, and runs for six months. It may be lodged by any person who chooses, whether he means to take out a patent or not; and it will entitle him to a notice of all patents that may be applied for on the subject which it names.

2. An affidavit is made by the party applying, that he has either invented or has had communicated to him by a foreigner some discovery, the general nature of which he describes at the same time by what is called its title.

3. A petition is presented to the King, through the office of the Secretary of State for the Home Department, praying a grant of Letters Patent for England, Wales, and Berwick-on-Tweed, either with or without the addition of the colonies, as the petitioner may think fit.

4. A reference is made by the Secretary of State, in the name of the King, to the Attorney or Solicitor-General to report on the application.

5. If there happen to be any caveats on the books of the Patent Office from persons to be engaged with similar discoveries, notice is now given to them, and a delay of about a week takes place in order to ascertain whether or no they intend to oppose the present application. If, by the end of that time, notice of an intention to oppose be given by any of them, the applicant's next step is to take out a summons for the hearing before the Attorney or Solicitor-General.

6. A week's notice is then given to each party of the time appointed for the hearing, which, from various causes, is, however, frequently much longer delayed; but, at last, on the parties both attending, the law officer before whom it takes place hears separately, first the applicant, and then his opponent; and, if he finds that the two claims are for different inventions, reports in favour of granting the patent.

7. That report must then be taken by the applicant to the Secretary of State's Office to be laid before the King.

8. After some time the applicant receives the King's warrant, directing the Attorney-General to prepare the patent.

9. Having carried this warrant to the Patent Bill Office, the party, generally in the course of about a week, receives his patent, with the signature of the Attorney or Solicitor-General.

10. It is now called the King's Bill, and must be taken back to the Secretary of State's Office for his Majesty's signature.

11. The King having signed it, it next goes to the Signet Office, where it passes, and is then called the Signet Bill.

12. From there it passes on to another office, where it receives the Privy Seal, after which it is called the Privy Seal Bill.

13. From the Privy Seal it goes to the Lord Chancellor's Office, and if a caveat be lodged, which, however, is now rarely done at this stage of the process, notice is given of it to the applicant.

14. He must now petition the Lord Chancellor to have the caveat removed, on which his opponent is called upon to support his opposition.

15. If the opposition be found not to rest on sufficient grounds, the patent receives the Great Seal, and is then completed. It used, formerly, to be taken after this to the Hanaper Office, but that form is now dispensed with, although the Hanaper fees are still exacted.

16. A certain time—generally not more than two months, but sometimes extending even to two years—is now allowed to the applicant to make out a specification of his invention; and it is only after he has lodged this specification that he is entitled to the benefit of the patent. The specification must be fairly comprehended under the title or general description already lodged.

In the first paragraph of this abstract from the Committee's Report the inventor must lodge a caveat, that is, an opposition to himself, in order that he may be entitled to due notice of the opposition of other people, whether solid or straw men. It does seem odd that an inventor in applying for a patent in those days should be compelled to pay a fee and give notice to the law officer that he is going to show cause why his own application should not be granted! This is what our slang gentry, had the world in those days possessed the wondrous fortune to have been blessed with their presence, would have called "awfully funny." Surely, it must have been of such a state of things that Macklin wrote, in the latter part of the last century: "The law is a sort of hocus-pocus science, that smiles in yer face while it picks yer pocket, and the glorious uncertainty of it is of mair use to the professors than the justice of it." I never heard that our famous old actor and dramatic author was an inventor, but the above "inelegant" language which he puts into the mouth of one of his characters in "Love à la mode," would seem to imply as much. *Caveat emptor; qui ignorare non debuit quod jus alienum emit* (Let the buyer beware; for he ought not to plead ignorance that he is buying the right of another.)

The term caveat comes from the Latin word *caveo*, to be on your guard; and in law it is used as a formal notice or caution given in a court to a judge, or public officer against allowing certain judicial acts to be performed in the interest of the party applying for their performance. Caveats had, and have, a strong ecclesiastical position, but in the general sense have long been known as the protest of an opponent entered in the Court of Chancery against the granting of a patent. In the old Court of Common Pleas it was a legal attempt to stop the imposition and levying of a fine by that Court. In the Ecclesiastical Courts it was to bar the way to the granting of probates of wills or administrations; and a notice served upon a bishop by any person who disputes the right of a clergyman to be inducted to a benefice. What the law upon the subject may be now, it is only for lawyers to determine, but in the cases named the caveat was said to be binding for three months by the Canon Law; and that a probate given, or an institution made, pending the caveat, has been considered wholly void in law. The Common Law, however, takes no notice of a caveat, as it does not consider it the act of a superior authority, but merely in the nature of a one-sided warning from a stranger for the information of the court or officer, in order to prevent wrong being done. Such is the caveat, and such was the kind of barrier that an inventor was forced by old patent law to erect against himself. The forms for taking out patents for Scotland and Ireland were somewhat different from those of England, and also from each other. It generally took about six weeks, assuming that all ran smoothly, to take out a patent for England, whilst in Scotland about half that time was sufficient; but in Ireland it was seldom completed in less than six months. "Justice to Ireland" was sadly wanted in the old patent times, for a complete affair cost about £128, although in England it was only £107, and in Scotland about £80. But when an opposition is carried to trial it is hard to say where the expense will stop.

Most of us of middle age remember the pin-heads of our boyhood; the fine bit of thread wire that was twisted round the blunt end of the stalk to make a flat head. At last an unlucky inventor hit upon a method of heading from the solid pin, and so doing without the thread-wire end. I have mentioned an "unlucky inventor." Alas! for their pockets health and peace of mind, there were two of them, and the second "lodged a caveat" as against the grant of a patent to the first. The caveat was allowed, and in due time they went right royally to law. I forget how many years they were at it. They had engineers, and "experts," and models and drawings, and all the rest of it on the grandest scale. Well, the bill was on a commensurate scale with all the rest, and it ultimately came out on "reliable authority" that that pin-head cost in one way and another before its point was finally cushioned, the princely sum of £70,000! I have often thought over that battle of the terrible inventors; have thought so much that the thinking has driven the winner and loser quite out of my head, driven them out years and years ago. "Oh, had I but Aladdin's lamp," I would have bestowed it upon the loser, in order that he might have discovered all the lost pins of the world—for there must be many millions yearly—and have sold them to the winner to make new pins, and a new fortune, and a new friendship.

In addition to the sums required by the law from an intending patentee, there are the drawings and the specifications which must be produced by trained professional advisers. One of the witnesses before the Committee said that he had known the drafting of the specification for one very intricate invention cost as much as £200. The average charge, however, was about £20. One of the clerks in the Patent Office stated that with short specification and no opposition, a patent would cost about £360 for the Three Kingdoms; but a patentee had paid as much as £450. As is usual in all inquiries—even with open sewers running down the middle of a street—one witness told the Committee that he did not see any defect in the Patent Laws, as they then existed! With that exception, however, all the witnesses examined universally condemned the state of the law, as so many people have been condeming it from that day to this. There was much difference among the witnesses as to what cost a patent ought to be obtainable at. One singular reason was given by a well-known successful adventurer of the time, and that was that if the cost was too much reduced the Patent Office would be so loaded that a person could hardly bend an iron in a particular shape without running the risk of infringing a patent. But that opinion was soon disposed of by evidence on the other side. It was stated *per contra*, that the great bulk of inventors are poor men; that they find it exceedingly difficult, even when their inventions are of value, to obtain the assistance of monied men; that under the present expensive system, as it is, in general, it is rather the bold and sanguine than the cautious and sober-minded who take out patents; that the author of a new invention has a right to be protected on the same ground as the author of a book or a piece of statuary; and that whatever evils might at first arise from lowering the price of patents, they are of a nature to gradually correct themselves and diminish. Several of the witnesses, who did not object to the expensiveness of patents on those grounds, strongly contended that the tax was an unfair one, as falling with the same weight upon all inventions, however different in profitableness. Much objection was taken during the inquiry to the running term allotted to a patent; namely, fourteen years. It was deemed to be too long a time for some inventions, and much too short for others to enable the patentees to derive a paying advantage. It was urged that inventors should have the privilege of taking out patents for shorter terms than fourteen years at a proportionate reduction of cost. Very severe complaints were made of the almost insurmountable difficulty of obtaining an enlargement of time even in the best of cases—so difficult, in dealing with the authorities, that few inventors cared to apply for it.

C. Stuart Murray.

(To be Continued.)

Correspondence Column.

SECRETS OF THE WATCH AND JEWELLERY TRADES.

TO THE EDITOR OF THE "WATCHMAKER, JEWELLER, AND SILVERSMITH."

Sir,—I have read with much interest the correspondence on the above subject, reprinted from the *Standard*, in your issue for February. I am prepared to endorse all that is therein said with reference to the harm done to the English watch trade by the Hall-marking of foreign manufactured watches. I would, however, venture to suggest an improvement on "E. H. M.'s" proposed remedy. He would have every watchmaker in business to show that he has served a proper apprenticeship. I quite admit the harm which is done by permitting unpractical men to deal in watches, but how many even of those who have served an apprenticeship are qualified to pass a thorough judgment on any watch submitted to them? In my opinion not one in twenty. During my seventeen years' experience as a working watchmaker I have found abundant proof that this is the case. Frequently have I met with youths who had been apprenticed to our craft for no other reason than because, being physically unable to engage in hard manual labour and mentally incapable of entering any of the learned professions, watchmaking was thought *an easy and comfortable way of earning a living.* When the mistake was discovered it was generally too late to rectify it: hence the superabundance in our trade of what has been very appropriately termed "brush and peg men." Still, under "E. H. M.'s" plan these men, since they could produce certificates of apprenticeship, would be allowed to start in business, and, what is still worse, would be allowed to engage apprentices and turn them out as finished workmen. The public know nothing of these matters. They are perfectly willing to give their confidence and their cash to the men who indulge most in advertising puffs. In the town where I am presently working there are thirty or forty watchmakers' and jewellers' shops, one half of which are owned by unpractical men, and I am safe to say that out of the whole number there are not more than three or four really good workmen. The largest businesses are, I am sorry to say, in the hands of men who never served any apprenticeship at all.

To my mind there is only one effectual remedy for such a state of matters. Compel each watchmaker to pass an examination before *competent* examiners, and give each candidate a certificate or diploma, stating his qualifications, and allow duly qualified men only to practice as journeymen or start as masters on their own account. This, I believe, is the custom in Saxony, and I am confident it would work well here.

Were such a reform possible, it would be a boon both to the workman and the public. To the workman, because the employers being duly qualified men, good workmanship would be appreciated at its proper worth; whereas under the present system a third-class workman stands as good a chance since the employer generally knows no better. To the public, because they would be guaranteed good value both in new watche sand in repairs.

Yours, etc.,

Aberdeen, 14th February. Chronos.

A correspondent writes from a well known town in the North of England to inform us that the jewellers there are desirous of forming an association, and asks for information as to the rules of similar associations. We are not acquainted with any such at present, but would be very glad to hear from any of our readers who could give the needed information. Last month, several American contemporaries devoted a large portion of their space to a detailed account of the proceedings at the seventh annual dinner of the Chicago Jewellers' Association, but it appears to us that the members are principally drawn from wholesale manufacturing firms.

Mr. E. J. Watherston has forwarded us a lengthy letter, headed "Voluntary *versus* Compulsory Hall Marking," containing a repetition of his well-known views on the subject, but our space does not permit of its publication. We, however, reproduce the following:—

"The Silver Duty Question.

"to the editor of the daily chronicle.

"Sir,—Last year, on a certain Saturday in April, working silversmiths waited, by a strong deputation, upon the Chancellor of the Exchequer, and very ably advocated the immediate and unconditional abolition of the duties upon gold and silver plate. In a few hours afterwards, for reasons, though easily surmised, best known to themselves, they altered their minds. The result, as we all know, was that the Chancellor decided to let the matter rest, and thus it is that an agitation, which must have a most disastrous effect upon the trade, is now about to be renewed. I would like, with your permission, to say a word or two to working silversmiths. They read *The Daily Chronicle.* In my opinion, they listened to very bad advice last year. They were thoroughly hoodwinked by the masters, and they know it. Some of them, I regret to find, are now working as omnibus-conductors along the Strand. Others have come to me for work, porter's work, in any trade; anything to 'earn an honest penny.' Shops are on half time. Masters have failed, and some shops have been shut up entirely. They know this as well as I do.

"May I be permitted to ask them what they are going to do this year? Are they going to seek to further perpetuate a tax which makes their work dearer, and therefore more unsaleable; or, like wise men, are they going to help me to abolish this impolitic trade hindrance? I do not ask for their assistance, as it is my impression that my task is nearly accomplished. But it is equally certain that if this year they consult their own interests, they will cut themselves adrift from their masters, and boldly declare for freedom from pernicious taxation of their craft.—Yours obediently.

"Edward J. Watherston.

"Pall-mall East. February 20."

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Trade Notes:

At the last meeting of the East India Association, in the Council Room, Exeter Hall, under the presidency of General Sir Orfeur Cavenagh, K.C.S.I., a paper was read by C. McKay Smith, Esq., on "The English Duties on Gold and Silver Plate: Their special Injustice as affecting the Indian Silver Craftsman." We are compelled to defer a fuller report until our next issue.

At the Mansion House on the 15th ult., Alfred James Mainwaring was charged on remand with obtaining a gold watch by false pretences.—Mr. Mullens, solicitor to the Bankers' Protection Association, watched the case for the London and County Bank.—On December 14th the prisoner entered the shop of Mr. Webster, a watchmaker, of 5, Queen Victoria Street, and purchased a ring worth 50s., in payment for which he tendered a £5 bank note, which was changed. The prisoner then said he wished to give a lady a watch, and might as well buy it there. Some gold watches were shown him, and he selected one of the value of £10 10s. He then took a cheque-book from his pocket and wrote out a cheque for the amount on the Winchester branch of the London and County Bank. The cheque was subsequently returned marked "No account." The particulars of the prisoner's pawning the watch and his arrest at an hotel in Finsbury were then given.—It was stated by the police that the prisoner had been a clerk in a county bank, and had been in the army for three years, but had deserted.—The prisoner who admitted two of the charges, was committed for trial.

The second annual evening concert, in aid of the funds of of the Watch and Clockmakers' Pension Society, took place at Foresters' Hall, Clerkenwell Road, on the 11th ult., and was numerously attended by the subscribers and their friends. The performance was of a high order of merit, and appeared to give universal satisfaction. Further information respecting the Society is to be found in our advertising columns.

Proceedings were recently commenced in the High Court of Justice, Chancery Division, before Mr. Justice Pearson, by Messrs. Benson, of Ludgate Hill, against the Manufacturing Goldsmiths' and Silversmiths' Company, of Regent Street, for an alleged infringement of copyright of their illustrated catalogue, but after two applications for adjournment on the part of the plaintiffs, they finally abandoned the action, which fact was announced in Court by Mr. Warmington Q.C. on the 15th ult., and it was therefore taken as dismissed with costs.

Sir John Bennett, of Glen Druid House, Chislehurst, and Cheapside, London, was summoned on the 18th ult. at Chislehurst Petty Sessions, by the Inland Revenue Commissioners for neglecting to fill up a declaration, in accordance with the Act of Parliament, relating to the use of armorial bearings. Mr. Powell, who appeared for the Commissioners, said all persons were required by law to fill up the declaration stating whether they used armorial bearings or not. The defendant had not only neglected to do this, but also used a crest for which he paid no duty. The defence was that the omission was accidental. The Bench fined Sir John 40s. and costs.

[Sir John Bennett wrote the next day to the *Daily Chronicle*, saying that he had not used a crest since he was robbed of his watch and seal in April last. Although the former had been restored to him, the crest was obliterated.]

In April last year we published a list of watches and jewellery stolen, on March 24th, from the premises of D. R. Samuel, of Liverpool, and a working jeweller named Robert Schmidt, who shortly after absconded, was charged with the robbery, and a reward offered for his apprehension. Mr. Samuel now writes to inform us that he has recently received information that the said Schmidt went to America and entered into the employment of Mr. Adolph Goldschmidt, a dealer in watches and jewellery, of 36, Maiden Lane, New York. On October 13th, he disappeared, and ten watches, valued at 1,500 dols., were missing. The police succeeded in arresting him, and he was sentenced to imprisonment for two years and a half. his former offence was not known, or the sentence would have been five years. Mr. Samuel is naturally anxious that the foregoing facts should be published, as the genuineness of alleged robberies is sometimes doubted. We remember once talking to a sergeant of police respecting an affair which created some sensation at the time of its occurrence, and he said—"That's no burglary sir, that's a family job."—The moral is, that employers should most carefully enquire into the antecedents of those whom they admit on their premises.

One of the best schools ever projected for the happiness of the human race has just been inaugurated—the Industrial School, built by money left by one of our citizens. We see by the daily papers that a number have passed the necessary examination to enter. There is to be a regular course of scientific instruction to fit the pupils for mechanical professions. Why not institute an Horological chair? Time to the community is everything. This a railroad age. It is also one requiring promptness in all the details of life. The watch is not an ornamental thing, but an instrument of necessity; alas that it, with its beautiful intricate machinery, when its wheels clog with the dirt of time, should be imperilled by being placed in incompetent hands, its beauty marred, its time-keeping qualities a thing of the past. There is no chance for the learner. The most ambitious can only hope to arrive at the acme of good workmanship by practice. Every day young men seek the city for the purpose of instruction, but there is no chance for them. The stores that do the best work have the run of the finest watches, and cannot bother with pupils. The consequence is, as is known to the trade, really fine watchmakers are scarce. Now we appeal to the managers of the training school to organize a department to impart instruction in the art of watchmaking and repairing. It would soon become self-sustaining; work would come in from the trade, so that it would not only be one of the most beneficial branches to the young man, but a source of revenue to the school.—*Chicago Jeweller.*

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The Worthies of Horology.

By C. Stuart Murray.

XIX.

THE CLOCKMAKERS' COMPANY.

Sixth Part.

I MENTIONED an instance in the last paper of what is known as "dead-letter law," and referred to the older Act of William III., that was passed in the year 1698 in the interest of the English Watch and Clock Trade. Had this Act with respect to the importation of clocks and watches been enforced the Clockmakers' Company would have been in a position to "rest and be thankful" for a while, instead of further burthening themselves with petitioning. As has been aptly remarked to me by readers of the last paper, that "dead-letter law" may apply to anything, from the making of roads to the making of clocks; it is the *principle* of the non-enforcement of an Act of Parliament for whatever purpose that Act has been passed, that gives point to the argument, and shows the anomaly of leaving the work of such Acts to be optional between the parties most nearly related to them.

After that very polite interview with Mr. Rose, in April, 1787, matters remained in *statu quo*; notwithstanding however, in the autumn of the year 1789, the company began to show signs of moving again, but this time upon a new basis. They now directed their attention to that powerful body in fiscal affairs, the Commissioners of Customs. The mode of procedure was ably planned, for it opened fire upon the Customs on a most vital point, that point being the receipt of customs duties. They said to the Commissioners, "We have certain information that a great number of foreign gold watches have of late years been imported into this country, though very few have paid the duty prescribed by law; and that a considerable number of such watches were lately seized and taken to the ware-rooms at the Custom House." The practice of surreptitiously importing such watches in the quantities in which they were imported not only affected the revenue most materially, but was also very injurious to the interests of English watch and clockmakers. That condition of things placed the home trade coupled with the burdens and restraints imposed upon it at very great disadvantage. One very strong point that was made was, that the gold used in the manufacture of English cases was required to be of a standard worth 81s. an ounce in its condition of wrought gold; whereas the gold cases from abroad were much inferior in quality, and paid no duty whatever. Another thing, on account of the lower standard of the gold, the metal was harder through the quantity of alloy being so much greater, and consequently so much less metal was required to answer the purpose of cases than if the English standard was used.

From those combined circumstances they told the Commissioners that they could not possibly bear up against what they considered not only unfair, but illegal competition from abroad, and they stated that they were afraid that business would go on from bad to worse unless the laws upon the subject were rigidly enforced. The evil was great and if it were not checked by the Commissioners, it would increase to the utter ruin of the English watch and clock trade, as well as to a corresponding loss in the revenue returns. Not only would that be so from the evasion of the law in respect to watches, but also by the loss of the duty upon both gold and silver wrought plate. The Company argued that not only what they complained of would be the case, but that the country would lose a valuable manufacture which at the time employed a vast number of hands, and many thousands of persons would in addition be reduced to poverty, be deprived of all means of supporting themselves and families, and become burthensome to the community. The Commissioners were therefore implored to protect the watch manufacture by carrying into effect the Customs Act, and prosecuting to condemnation the present and all future seizures.

This remonstrance had an effect thus far, that the Customs officers did increase their vigilance, and many seizures and condemnations took place accordingly; and such vigilance was kept up that contraband ventures became very risky, but nothing in the way of legislation was effected.

It seems to us in these days a little singular, a something partaking of the "let well alone" way of taking things, that the Company rested as it were upon their oars, contrary to all expectation, for a period of five-and-twenty years! When they did move they selected a year that might have been thought entirely fatal to their purpose; that was the uneasy year of 1814, when all Europe, and especially England, was in a very excited state about the probable result of the Duke of Wellington's campaign against the First Napoleon. The battle of the Pyrenees had been in the July of 1813, Marshal Soult having been defeated by the Duke of Wellington; whilst in the following August General Graham, after what was called a siege of slaughter, took the strongly fortified Saint Sebastian in Spain. Looking at the state of public affairs then from our present standpoint we may express a surprise that it did not occur to the clockmakers that the Government of the day had much more weighty affairs on hand than to be troubled with those of their Company, or, indeed, of any company whatever.

But that was not the opinion of our ancestral timekeeping makers; far from it, as will be seen. At a monthly court which was held on the 4th of May, 1814, they resolved that a petition should be presented by them to the House of Commons; and presented it was accordingly. As the petition has its philosophical as well as its mercantile side, and deeming it to be of historic interest to us in this year of grace, 1884, I subjoin a copy of it:—

"*To the Honourable the Commons of the United Kingdom of Great Britain and Ireland in Parliament Assembled.*

"*The Humble Petition of the Master, Wardens, and Court of Assistants of the Art or Mystery of Clockmaking of the City of London:*

"Sheweth,—

"That the art of making clocks and watches was long since established, and has been carried on in this country with great private and public advantage, and has attained unequalled excellence.

"That till within a few years past, more than one hundred thousand clocks and watches have been annually made; whereby the sum of at least £500,000 has been produced by British labour, on materials principally of British produce; and that many thousand artisans were thereby usefully employed.

"That the national advantages derived from the perfection to which the art of clock and watchmaking has been carried in this country are not limited to the value of its produce, but extend to every branch of manufacture in which machinery is used.

"That from the operation of various cause, the value of the clock and watch manufactory, as a source of national advantage, has of late years been greatly deteriorated, and continues rapidly declining: the manufacturers, deprived of adequate employment, are obliged to seek other means of subsistence; and the workmen, in all its branches, are in great numbers reduced to distress, or are dependent on parochial relief for support; and many of the superior workmen, destitute of suitable encouragement at home, have been seduced to foreign countries, carrying with them their knowledge and ability to construct and employ the most valuable and useful machinery, whereby the principal manufactures of Great Britain will be transplanted and established in foreign countries to the exclusion of the British manufactures.

"That the former prosperity of a manufacture, intrinsically and relatively important, was in a great measure attained by the enforcement of the restrictions imposed by Act of Parliament on the importation of foreign clock and watchwork, as well in an incomplete as in a complete state.

"That in the year 1787 a duty of 27½ per centum was imposed on all foreign clocks and watches imported into this country; which duty has subsequently, from time to time, been increased, and now amounts to 75 per centum.

"That in consequence of the want of provisions adequate to the collection of such import duties, the illicit introduction into this country of foreign clock and watch-work has obtained to an extent ruinously injurious to the British manufactory; and the advantage derived by the smuggler having increased in proportion to the increase of the duties, the illicit trade is now so regularly systematised that the importers will undertake the safe conduct and delivery of foreign clock and watch-work (without payment of duty) in this country, for 10 per cent. on it value; thus affording the illicit trader a premium of 65 per cent., which enables him to undersell the British manufacturer, and to the great injury of the Public Revenue.

"That this facility with which foreign clock and watchwork is illicitly imported into this country is one of the principal causes of the declining state of the British manufactory.

"That during the long continuance of the war, the exportation of British clock and watch-work has very much diminished, while the illicit importation of foreign clock and watch-work has increased to an unprecedented degree during the same period; and unless some new remedy be opposed to the evil, there is reason to apprehend that whenever a general peace shall be made, the condition of the British manufactory of clocks and watches will become still more calamitous, from the increased facilities with which foreign clock and watchwork will then be illicitly introduced into this country, as well for home consumption as for the export trade.

"That foreign clocks and watches are illicitly imported for sale in all parts of the kingdom; and that in order to obviate any impediments which national preference, joined to the acknowledged superiority of English work, might oppose to the sale of foreign watches, they are illicitly imported in an incomplete state; and being made to resemble in their exterior appearance English watches, are sold as English to the great injury of the public, and the ruin of your petitioners.

"That no permanent nor effectual relief to the distress of your petitioners can be obtained unless the wisdom of Parliament should interfere, and remove or mitigate those evils, the existence and consequence of which your petitioners most humbly represent, and most sincerely deplore, and are prepared to prove to your Honourable House.

"Your petitioners therefore humbly pray—

> "That your Honourable House will investigate the extent and the causes of the evils of which they complain, and will afford to your petitioners such relief as to your Honourable House may seem meet."

Now that petition is really worth thinking over, as it gives a wonderful insight into the state of the watch and clock trades during the closing years of the great Peninsula War. Watch smuggling was in itself a distinct and valuable, if risky trade; it gave a considerable impulse to quite a different trade, and that one was, of all others—bootmaking! "What, in the name of wonder," it may be asked, "what had bootmaking to do with watches; or how could it have affected the interests of the Clockmakers' Company?" Why, in this way. Boot-heels were worn very high at that period; and that being so, the "military" heel, as it was called, was even higher still; the smuggler saw his opportunity, and instead of being a solid fixture each heel was only a shell, "palpable to sight," and contained, snugly ensconced therein, a couple of gold watches, cased and all! The escapements were wedged up with paper or cork, to prevent them making a noise, and in this way thousands upon thousands of pairs actually passed through the hands of the Custom House officers, poor innocents as those officers were. When the Wellingtons reached their destination in London, that destination was a bootmaker's warehouse where the contrabands were emptied of their hidden treasures, re-heeled and passed on to the shops of the retail dealers for "consumption"—everything is "consumed" now—by their respective customers! As every pair of boots contained at least four gold watches—many of them six—and as there were hundreds of pairs imported in each parcel, the profit of the smugglers with a duty rising to 75 per cent. was something handsome. There were generally four partners in the work; the bootmaker abroad and his watch buyer, and the bootmaker in London and his watch distributor; all *bonâ fide* men, well and publicly known in the exercise of their several trades. Family fortunes were made at the business in the "boot line" alone—and there were many other ways—in fact it was "too good" to last; the secret leaked out, discovery resulted, and "the little gold mine" that should have enriched the taxpayer from the first, was returned to its legitimate channel. No wonder at the Company memorialising and petitioning when they saw the very bread, as it were, taken out of their mouths, the bread of themselves and their workmen by the thousand, by "the illicit trade now so regularly systematised," and so little being done to strangle that trade. No wonder at "protection" being loudly called for; no wonder at the decline of the clock and watch trades, and that the Imperial Parliament should be so strongly invoked to use all its powers to amend such a sad condition of affairs.

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The Coming Metal.

Aluminum, with one exception, is the most abundant metal known. The material, alumina or clay, from which it is produced is not confined to any locality or country. It is found everywhere. It is more than half a century since the eminent German chemist, the late Friederich Wohler, who for fifty years was Professor of Medicine and Director of the Chemical Institute at Gottingen, discovered aluminum and that it could be produced from common clay and from alum, and still it is among the least familiar of metals. Its usual price is £4 per pound, and until the past year it has only been known as "aluminum gold." After many experiments extending over a series of years its manufacture was abandoned, except in one instance, to the French, who only produced it in inconsiderable quantities. After more than thirty years' labour and at a cost of more than £250,000, the eminent chemist and metallurgist, James Webster, has discovered a method of making aluminum by burning or roasting alum, instead of making it in the old and tedious way by precipitation. By the new process it takes only one twenty-fourth of the time required by the old method and costs less than one-tenth as much. Instead of producing the alumina powder by the old and slow method of precipitation, Mr. Webster burns the alum with pitch in a calcining or roasting furnace, prepared expressly for this purpose, the product being a grey ash or powder, in appearance much like the ashes of cinders from an engine furnace. This grey powder, according to all scientific authorities, is no more or less than burnt alum. By another process this ash is converted into another product, which contains from eighty-four to ninety-five per cent. of the alumina, having left behind it several bi-products, which nearly pay the cost of working. The alumina thus produced is better than that by the old method of precipitation, in that it is much finer in texture and almost entirely free from silica. The discoverer has been producing 200 pounds of alumina per week for more than a year, the value of which is £4,000 or £208,000 per annum, the result of which has been that at the present time a manufactory which covers more than one-half an acre is kept busy night and day, with orders ready for more than fifteen months' work. The present output is twenty tons of aluminum metal per week. From the results already obtained by the aluminum bronze factory (near Birmingham) it is plainly evident that in a very short time this almost new and peculiar metal, which never oxydises or corrodes, and which never tarnishes under any circumstances, to which can be given the colour of gold, silver, bronze, or purple, and which differs from all other metals in that it is never produced direct from ore, but only by a long and elaborate process, must become an important factor in the manufacture of jewellery; and notonly so, but that almost every article made from metal, from the screw-propeller or anchor of the largest steamship down to the tiniest teaspoon, must be manufactured from it, or its alloy or bronze.

The chief value of aluminum, at present, is in tempering or giving strength and a surface or body to alloys, bronzes or metals, so that they will not corrode. To copper, tin or zinc it gives such properties as can be obtained by no other means, softening their nature while increasing their real hardness and strength, and enabling them to resist all the tests applied to gold or silver, preserving them from corrosion and rendering them more ductile and refined, and giving them a surface and body that withstands the chemical action of the elements. As a result of this new process of making aluminum, all plated goods, nickel or silver, watch cases, cups, saucers, spoons, knives, forks, gun and pistol barrels, pistol handles, gun, harness, carriage and saddle ornaments made of brass, nickel, German silver, bronze or silver, must give way to those made of aluminum or bismuth bronze. Pianoforte wires made from it will vibrate ten seconds longer than the best now in use. The tensile strength of aluminum or bismuth bronze being the same, only in the latter 1-1800th part of bismuth is added, had been proved, by repeated tests, to bear a strain of forty-two tons to the square inch, or fourteen tons more than gun metal, and twelve tons more than the best Bessemer steel. Whenever and wherever there is need of a metal, and one is demanded that cannot crystallise or corrode under any circumstances, a metal that combines great strength and flexibility, it is plain that aluminum must be used. In the tests already made with propeller screws, blades, journal bearings, and heavy artillery made from aluminum or bismuth bronze, as against those made from the best gun metal, the ship builders decided in favour of the former as the strength was so much greater and the weight so much less, being only one-fourth as great.

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Stealing a Chatwood's Safe.

On February 1st, between twelve and four o'clock, a.m., a most daring safe robbery was perpetrated at the premises of the Dairy Supply Company, Museum-street, Bloomsbury. The thieves went to work with great ingenuity. They effected an entrance by the churn-house in Duke-street, and left a trap there in readiness. They then proceeded to the cashier's room, and had to break a window before they could gain an entrance. Having discovered the locality of the safe, which was in a cupboard, they placed a thick layer of chaff on the ground, and then removed it almost noiselessly. That several men were engaged in the robbery is evidenced by the fact that the safe, weighing seven or eight cwt., was taken from its place and conveyed some fifty yards to the trap, which was then driven off. Although a caretaker slept on the premises, the robbery was not discovered till shortly before four o'clock by one of the *employés*, who gave information to the police and obtained the services of a detective. The latter inspected the premises, but was unable to procure any clue that would lead to the apprehension of the thieves. The safe, one of Messrs. Chatwood's thief-proof safes, contained between £350 and £400 and some valuable securities. A reward of £50 was promptly offered for such information as would lead to the recovery of the safe and the contents, and the capture of the burglars. Afterwards the constable on the beat was called and interrogated. He stated that he had seen nothing unusual at the Dairy Company's premises, but soon after he came on duty he had noticed a pony and cart loitering in Museum Street, sometimes with a driver and sometimes without. Not knowing what to make of the matter, he took the address which was painted on the cart. This intelligence was at once wired to Arbour Square Station, the district to which the cart belonged, and a sharp watch was kept on Bale and Bond Streets, Stepney, from one of which places the cart was believed to have come. Early the next morning, Police-constable Cathcart, with some other officers, entered the premises of a marine-store dealer in Bale Street, where they found the missing safe. It was jagged and cut about where attempts had been made to open it, *but it was still intact with its contents*. The safe, which *took six men to move it*, was conveyed to the station. A large quantity of house-breaking implements were, it is stated, found on the premises. The marine-store dealer was apprehended for receiving the safe. —*Morning Post.*

Tinkering with Time.

The Curious Changes in the Calendar that Culminated in Leap Year.

The first division of time marked by primitive man was probably that indicated by light and darkness: "And the evening and the morning were the first day." Yet how to mark the beginning and ending of the day was not so simple a matter. With the Babylonians, Persians, Syrians, Greeks, and nearly all the nations of Asia the day began at sunrise and lasted through the period of daylight and darkness, to sunrise again, and with the Jews, Turks, Austrians, and several of the European nations it began at sunset. The Arabians, however, and with them the astronomers and navigators of all nations, have always begun the day at noon, while modern Europeans, Americans and the Chinese place its beginning at midnight, which seems the most convenient plan of all.

The day proper has always included the entire period of twenty-four hours of the earth's revolution on its axis, and subdivisions of this time came later. At first the ancient Chaldeans, Syrians and Jews divided the twenty-four hours into four parts. Ancient Rome took no note of any division save that of mid-day, when the sun shone straight "between the Forum and the Græcostaiss." No mention is made of hour in the Scriptures until the time of Daniel, 552 B.C. the When the Jews made the division of time into hours it was entirely arbitrary, and consisted of dividing the time of light and also that of darkness each into twelve parts. So the length of an hour differed with the latitude and the time of the year. The Romans followed this plan also for many years. The division of the hour into minutes and seconds originated with the Babylonians, whence it was taken by the Greek astronomer, Hipparchus, about 200 B.C. into his country, and thence went to Egypt and Rome, and was carried down the stream of civilization until it found a resting place where nothing could dislodge it on the dial-plates of our watches and clocks.

We may remark, in passing, that though most nations have their time-keepers marked with the twelve hours, thus dividing the day proper into two parts, the Italians, Bohemians and Poles mark theirs with twenty-four, running from 1 to 24 o'clock, and there is a probability that the latter division may be adopted in this country. The Chinese, on the other hand, have but twelve hours, each being twice the length of one of ours. And the French, when they attempted at their Revolution to turn all civilization upside down, divided the twenty-four hours into ten, to suit their decimal system.

Morning and afternoon are arbitrary divisions originating no doubt in the adoption of the mid-day meal. It is still held in England and Scotland that all the time before dinner is morning. Thus, one day, entering the office of an English gentleman now in business in Chicago, about 2 o'clock, and finding him deep in accounts, I greeted him with the usual "Good afternoon." His sole reply was the droll ejaculation: "Happy mortal! thou hast dined!"

To return to primitive man, whose dinner-hous uited the convenience of his larder only: The next great natural division which he probably marked was that indicated by a lunar revolution, a moon, or month. This is the period during which the moon revolves once around the earth, and is equal to 29 days, 12 hours, 44 minutes, 3 seconds. And while watching the changes of the moon he naturally observed the movements of the stars also, and thus traced the passage of the sun through the Zodiacal signs, and marked the beginning and the end of the year. Before he did this, however, the changes of the seasons had made an impression, distinctly felt, on his senses. It is rather remarkable that the most ancient nations chronicled only two seasons, summer and winter, as though the difference between these was so great as to obliterate all shades of temperature intervening. This distinction of seasons would be observed to depend on the position of the sun in the heavens, his alternate elevation and depression; but the actual division of time into solar years was obliged to wait until something had been learned by the watchers concerning astronomy, When this had been done, the Chaldeans, Egyptians and Hindoos, and other ancient nations measured the periodical returns of the seasons by twelve lunations, and then the year and its constituent part, the month, began to be understood.

The division of the month into weeks, though entirely arbitrary, was of ancient origin. The Jews had weeks of seven days each, making the number of days in which the world was created. But the Hindoos and Chaldeans had a similar week, and whether they took it from the Jews, or attached it to a similar legend, cannot now be known. We take the names of our days of the week from those used by the Saxons, thus:—

Sunnan daeg—Sunday.
Monan daeg—Monday.
Tuesco's daeg—Tuesday.
Woden's daeg—Wednesday.
Thor's daeg—Thursday.
Friga's daeg—Friday.
Sater's daeg—Saturday.

Now, the names of the Roman days of the week were not at all similar in sound, but very similar in meaning. The first day with them was also the day of the Sun, Dies Solis, and the second day of the Moon, Dies Lunæ. The other days were given to the deities of like character to those chosen by the Saxons, a coincidence that is very difficult of explanation.

The German names are very similar to those of the Saxon, being of like Scandinavian origin. The French names are taken direct from those of the Latin.

We have the names of our months from the Romans, with whom we find our present calendar evolved in the time of the Cæsars. It had been found very difficult to adjust the measure of the years correctly. The first measure of a year was twelve lunations, which was a period equal to 354 days, 8 hours, 48 minutes, 36 seconds. This was dropped for the time of the sun's passing through the signs of the Zodiac, which was 365 days, 5 hours, 48 minutes, 49 seconds. The solar year was then fixed at 365 days, and the odd hours were dropped. But as they could not be annihilated, and in accumulating threatened to change the character of the seasons, in 44 B.C. Julius Cæsar made a readjustment of matters. Assuming the overplus of time to be six hours daily, he decreed that every year should have 365 days, except the fourth, which should have 366. The repeated day was to be the 24th of February, the sixth before the Kalends of March, and the year was therefore called Bissextile. We call it Leap-year because the insertion of an extra day makes all following dates leap a day. Julius Cæsar arranged the months and their days so that every odd month, first, third, etc., should have thirty-one days, and every even month thirty days, except February, which had thirty only in Bissextile year. He retained the names of the months as they were supposed to have been originally given them by Numa Pompilius, except that he gave his own name to the seventh month. This arrangement of months and days was changed by Augustus Cæsar, who, desiring to give his own name to the eighth month, took a day from February to give this thirty-one days, and then transposed the number of days in the months following, making November and September the shorter months instead of the others. As thus arranged the months still remain. The very convenient verse beginning, "Thirty days hath September," might have been written by Augustus Cæsar himself, but it probably was not. It was, however, no doubt in common use long before the first record was made of it, in 1606.—*Detroit Free Press.*

Electro-Plating with Nickel.

By William H. Wahl.

[A paper read before the Chemical Section of the Franklin Institute, and published in the Journal of the Institute.]

NICKEL-PLATING is an American industry, in the sense that it was first successfully practised on the commercial scale in the United States, and here received that practical demonstration of its usefulness that has since made it the most successful and most widely practised branch of the art of electro-plating. Coming first into prominence and popularity about ten years ago, it has since that time rapidly grown, until to-day it has developed into an industry of great magnitude. The almost silvery whiteness and admirable brilliancy of electro-deposited nickel; its cheapness as compared with silver; the hardness of the electro-deposited metal, which gives the coating great power to resist wear and abrasion; the fact that it is not blackened by the action of sulphurous vapours, which rapidly tarnish silver; and the circumstance that it exhibits but little tendency to oxidise even in the presence of moisture, are sufficient to explain the great popularity which nickel-plating enjoys.

The industrial development of the art, however, which has been surprising both in respect to its rapidity and extent, may be attributed in a large measure, to certain favouring circumstances, quite independent of the excellent adaptability of the metal for electro-plating purposes. These circumstances are: first, the great advances that have been made within the period above named, in the production of nickel on the commercial scale, by which the cost of the metal has been greatly reduced, and its purity greatly increased, for which we are indebted largely to the American Nickel Works of Camden, N.J., under the scientific management of Mr. Joseph Wharton;* and second, the introduction and great

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* Mr. Wharton has produced at his works in Camden, N.J., since the year 1876, to the close of the year 1882, 1,466,765 pounds of metallic nickel. He began experimenting very early to determine whether nickel could not be produced in a pure and malleable condition, susceptible of being worked in nearly the same manner as iron, and of being applied in the manufacture of various objects demanding a strong, non-oxidizable metal. He succeeded so well that he was enabled to display at the International Exhibition in Vienna, in 1873, a sample of nickel in the form of axles and axle-bearings; and at the Philadelphia Exhibition, three years later, he exhibited a remarkable series of objects made of *wrought nickel,* such as bars, rods, etc. These objects, from their unpretentious character did not attract the attention they deserved. As a matter of justice to this indefatigable and intelligent worker, the fact should be placed on permanent record that he had succeeded as early as the year 1873, and with the lean and sulphuretted ores of Lancaster Gap, Pennsylvania, which yield only from 1½ to 2 per cent. of nickel, in producing the metal in malleable condition.

The recent discovery of pure carbonated and oxidized ores of nickel in the French colony of New Caledonia, has greatly stimulated the production of this metal and lessened its price; and the highly ingenious refining process recently discovered by Dr. Fleitmann, which is now altogether used in the production of the pure metal, has tended in the same direction.

The subject is of such interest that I quote the following brief account of Fleitmann's process, from a paper read before the American Institute of Mining Engineers at their meeting in Boston, in 1882, by Prof. W. P. Blake, of New Haven, viz:

"Dr. Fleitmann, of Iserlohn, Westphalia, Prussia, has improved and cheapened the operation of refining nickel and toughening it, and has reduced the liability to the presence of blow-holes in castings by adding to the molten charge, in the pot, when ready to pour, a very small quantity of magnesium. This is immediately decomposed, magnesia is formed, and graphite is separated. It would seem that the magnesium decomposes the occluded corbonic oxide, or reduces it to a minimum. The magnesium must be added with great care, and in small portions, as it unites explosively with the charge. It is stirred in. About one ounce of magnesium is sufficient for 60 pounds of nickel. From three-quarters of an ounce to 54 pounds of metal have been used with success by Mr. Wharton. The nickel from the ore at Lancaster Gap seems not to require as much as the foreign metal. It is to be noted that complete malleability of nickel was obtained at improvement within this period, of the dynamo-electric machine, which placed at the disposal of electro-platers a constant, powerful, and cheap source of electricity, in the place of the uncertain, troublesome, and comparatively expensive voltaic battery, to the use of which they had of necessity been hitherto confined. Alex. Watt[*] was among the first, I believe, to call attention to these facts. He states for example that "the difficulty in obtaining pure nickel anodes of large surface, for many years checked the progress of this useful art, whilst the slow and uncertain action of the ordinary battery rendered it ill-suited to the deposition of this peculiar metal on a large scale;" again, "it is doubtful whether nickel-plating would ever have held a really high position in the arts, if the dynamo-electric machine had not been introduced;" and in another place: "Indeed, as we have said, it is doubtful if this branch of the art (*i.e.* nickel-plating) could even have been extensively pursued with advantage on a large scale, if battery power alone were available." In considering the subject of the present very extensive application of nickel-plating, therefore, the above facts and explanations should not be lost sight of. So general has the demand for nickel-plating grown to be, and so universally is it employed, that, for the sake of economy, hundreds of establishments throughout the United States engaged in the manufacture of the most miscellaneous articles of brass, copper, iron and steel have introduced the nickel-plating plant, and do their own plating. Furthermore, innumerable small articles of metal, of trifling value, are nickel-plated after a fashion, by the manufacturers, not to protect them from the action of corrosive agents, but simply to catch the eye of the purchaser and to make them sell. As may readily be imagined, this state of things has produced a severe competition among those engaged in the business of nickel-plating which, while it has had the effect of bringing down prices to extremely low figures, has incidentally also had the effect of causing a very general deterioration of its quality.

An enumeration of the great variety of products that are nickel-plated would be impossible; among them may be named dental and surgical instruments of every description, harness and saddlery-trimmings, carriage-fittings, spoons and forks, locksmith's work, brass cocks and faucets, and the decorative metal-work of plumbing and sanitary wares, scale and balance-beams and weights, mountings of guns and pistols, the metal parts of lamps and lanterns, fire-grates and fixtures, stove decorations, door-plates, cuspadores, watch- and clock-cases, hand-rails of railway cars and car-seats, etc., stair rods, points of lightning rods, show cases, the external parts of sewing machines, steam and water valves, gauges, and miscellaneous machinery accessories without number.

From the very brief account that M. Roseleur gives of this subject, it would appear that the art of nickel-plating had received little or no attention in France up to the year 1880;[*] furthermore from the somewhat contemptuous reference with which he dismisses it, it is apparent that at that time he had no knowledge of the remarkable progress and development of the art in this country, and no conception either of the perfection to which the processes had been brought, or the beauty and utility of the results obtained.

Although, however, it would appear from the remarks of the author, just referred to, that nickel-plating had received but little attention in France up to the year 1880, the art appears to have been transplanted to England with much success, as the following reference to the subject by Watt[†] will testify: "The time has now arrived, however, when it may be fairly stated that the art of nickel plating has become, in proper hands, one of the most successful, and at the same time one of the most extensive branches of electro-deposition. For several years nickel-plating in this country (*i e.* England) had been principally confined to some three or four houses. Now, however (1880), the process has been most extensively adopted in London and throughout the kingdom, as also in many foreign countries. There is no doubt that its extensive application in the United States acted as a stimulus to our own manufacturers, who have steadily, though tardily, recognized in nickel a most useful coating for certain kinds of metal work."

NICKEL SOLUTIONS.

One of the earliest allusions to the electro-deposition of nickel is that of M. Ruoltz[‡] in the year 1841. The reference is as follows: "The same method, that is, the use of a solution of the double cyanide in water (prepared by dissolving the metallic oxides in cyanide of potassium), may be employed for coating other metals with copper, tin, cobalt, *nickel*, and zinc." In 1843 Smee[§] states that "metals may be covered with nickel by proceeding as in former cases. The solution to be used is the chloride of nickel with a nickel positive pole. The single battery process is to be preferred, but pure nickel, though *very brilliant*, is apt to be rather brittle. . . . It is best reduced by the compound battery process, with a platinum positive pole, though a nickel positive pole may be employed. When we employ either the nitrate or sulphate of nickel for electro-metallurgy, it is preferable to use the solution as strong as possible. Of the compounds of these salts with the alkalies, those with ammonia deserve the preference, and the ammonio-nitrate and the ammonio-sulphate may be used for the reduction of this rather troublesome metal."

(*To be continued.*)

Wharton's works in Camden, before Fleitmann's invention or process, but this last is more rapid and better than the old method. The metal so treated becomes remarkably tough and malleable, and may be rolled into sheets and drawn into wire. Cast plates can be successfully rolled. The cast plates, such as are made for anodes, after reheating, are rolled down to the desired thickness. It it found that it is a great improvement to the nickel anode plates to roll them down. They dissolve with greater uniformity in the bath. Nickel so treated with magnesium has been rolled into sheets as thin as paper. Expensive works for rolling the metal have been erected by Mr. Wharton at Camden. There is already a train of 40-inch rolls, 18 inches in diameter, with annealing-ovens and gas-furnaces and their adjuncts, and a 90 horse-power engine. The largest sheet yet rolled at Camden is 72 inches long and 24 inches wide, of pure nickel.

"Dr. Fleitmann has also succeeded in welding sheet-nickel upon iron and steel plates, so as to coat them equally on each face with a layer of nickel. The quantity preferred by weight is $\frac{8}{10}$ iron and $\frac{2}{10}$ nickel, one-tenth of nickel being placed on each surface. To secure union, the iron or steel must be perfectly flat and clean. A pile is made with outer facings of sheet-iron, to protect the nickel from scaling. When the whole is heated to the proper degree, it is passed through the rolls. The two metals become so firmly united that they may afterwards be rolled down two or three together, or separately, to the thinness desired."

Consult also, *Jour. Franklin Institute*, cxvi., 60, *et seq.*, Art. "Notes on the Metallurgy of Nickel in the United States." By William P. Blake, F.G.S.

Also "Galvanoplastic Manipulations." By William H. Wahl, Ph. D., Philadelphia. H. C. Baird & Co., 1883.

[*] "Electro-Metallurgy, Practically Treated." By Alexander Watt, F.R.S.S.A. 7th Ed., 1880. P. 86, *et seq.*

[*] "Manipulations Hydroplastiques," etc.; *par* Alfred Roseleur. 4e. Ed. Paris, 1880, p. 300.

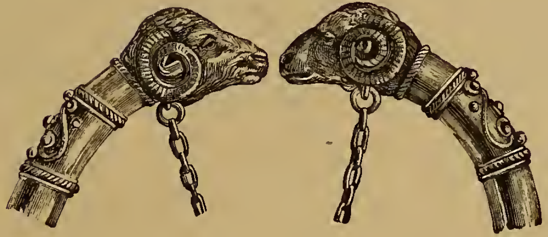
[†] "Electro-Metallurgy," p. 87, *et seq.*

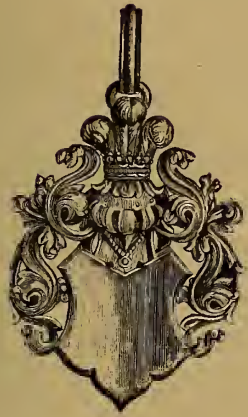
[‡] Ruoltz, "L'Institut," Nr. 414, p. 410; also Berzelius "Jahresber." xxii, p. 96.

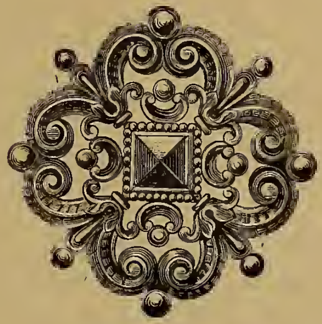
[§] Smee, "Elements of Electro-Metallurgy," 2d (Lond.) Ed, 1843. pp. 154, 219.

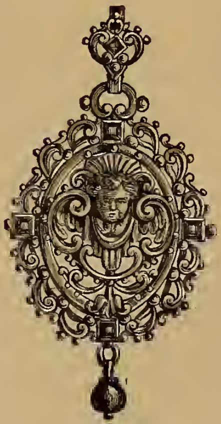
Supplement to the Watchmaker, Jeweller, and Silversmith, March 1st, 1884.

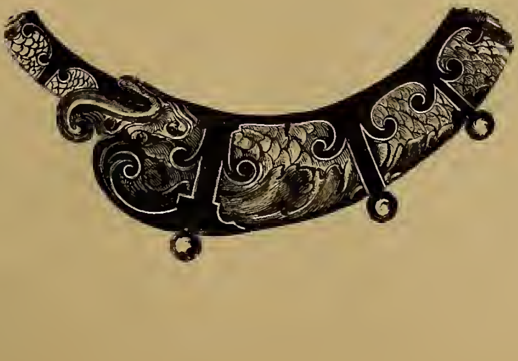
MONTHLY SUPPLEMENT OF DESIGNS.











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ILLUSTRATED SUPPLEMENT:—"Designs for Modern Jewellery."

The Silver Duty,

THE reply of the Chancellor of the Exchequer to the deputation from the Council of the East India Association, which waited upon him on the 20th ult., viz., that he did not propose to deal with the duty this year, was probably expected and relied upon by those members of the trade who are satisfied with the existing state of things, and who had several opportunities of fully explaining their position to him last year, in consequence of which he withdrew the impracticable scheme of bonded warehouses.

Much of the matter bearing on the question which appears in our columns this month, has lost its point; but we preferred not to withdraw it, as it will demonstrate that the advocates of "freedom" have been working up to the last, although thus far, their efforts are unsuccessful, and the recent enforcement of the Hall-marking regulations on all plate imported, whether by private buyers or dealers, which had hitherto been largely evaded, makes the trade more than ever a "protected" one.

There is not doubt but that the trade cling to the duty, on account of the security which the compulsory Hall-marking system affords them against foreign competition; they regard it in the same light as Wellington did Hougoumont at Waterloo. It is furthermore scarcely to be expected that any voluntary system would be carried on at the loss which is stated as being sustained by the Goldsmith's Company; and at the present time voluntary Hall-marking is largely practised because the public do not distinguish between those articles which must be done, and those which are done at the will of the makers. If it were known, as it would be known, that the supervision of the Goldsmith's Company had been withdrawn, the probability is that the trade in the precious metals would become generally disorganised, with the usual result, viz., ruin to the workmen.

With regard to the drawback, our belief is that the trade will not get it; and at the same time the Chancellor of the Exchequer recognises the justice of the claim sufficiently not to arbitrarily repudiate it. Therefore, until the demand is greatly moderated or voluntarily withdrawn, matters will probably go on in their present unsettled fashion. It is not to be expected that £50,000 a year, more or less, will be given up, unless some corresponding benefit can be realised; and when an entire trade with but few exceptions are begging to be let alone, the easiest way is to comply with their request.

We do not think that the Indian workmen would gain much by the removal of the restrictions, or that the rupee would be enhanced in value. A few years ago Mr. Watherston was highly extolling the beauty of American silver plate, and it is only reasonable to suppose that

American manufacturers, backed up by such mines as the "Nevada," would secure an important place in the market, as a special exception could not be made in favour of our Indian subjects. Mr. Childers is doubtless fully aware of this.

The following leader appeared in the *Daily Chronicle* :—"It is to be regretted that Mr. Childers was unable to promise any concession, this year at least, to the deputation from the East India Association, who waited upon him to urge the expediency of abolishing the duty on gold and silver plate. We are not surprised that the deputation were dissatisfied with the answer of the Chancellor of the Exchequer, and intimated their intention of taking the opinion of the House of Commons on the subject. Mr. Slagg, who with Sir George Balfour spoke on behalf of the deputation, will, we trust, find an early opportunity of submitting his resolution for the total abolition, not only of the objectionable impost, but also of compulsory Hall-marking. The stamping process as well as the tax subjects the Indian exporter of gold and silver plate to great convenience and vexation. The fine gold and silver work of Indian manufacture, especially, suffers from the rough usage it undergoes at the hands of the Hall-markers. Considering that India has remitted duties on English goods to the extent of over a million and a half sterling there appears to be something very unfair in the continued imposition by England of the tax on Indian gold and silver plate. It is absurd for us to be always preaching about what we have done for free trade, while we retain import duties on articles of the highest value. There are no doubt difficulties in the way of the abolition of the tax—difficulties arising out of the question of drawback; but Mr. Watherston has indicated how these can be disposed of. In fact we believe there are some dealers in gold and silver plate who would rather sacrifice the drawback than have the tax continued. A desirable impetus would be given to an important branch of our commerce with India if the duty which has so long been complained of were abolished. Another injustice from which the Indian manufacturer suffers is that he has to send his goods in a finished state before they can be examined, whereas the English manufacturer can send in his articles in an unfinished state. The English manufacturer, again, can repair any damage done to his goods during the process of marking, an advantage which his Indian rival does not possess. It is the tax, however, which imposes special hardship upon the Indian producer. As Mr. Slagg remarked, it is unfair to maintain a restriction upon the importation of an article of Indian manufacture for which, if the impost were abolished, there would be a natural and growing demand in this country on account of its superior artistic merit. Moreover, as India sacrificed a large amount of revenue by the abolition of the duties on English cotton goods, this country might reasonably be expected to sacrifice the much smaller amount of revenue derived from Indian gold and silver goods.

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Business Abroad.

THE *Journal Suisse d'Horlogerie* recently published a number of detailed reports from various foreign consuls of the state of the watch, clock, and jewellery trades in their respective stations, from which we have selected the following :—

Germany.—Finely finished and solid rings and chains for gentlemen have not been in much demand in 1882, whilst jewellery for ladies has been fairly elegant. The sale in Germany has been unequal, insomuch that it was better in the localities where the prosperous state of business induced the public to buy; in other parts the contrary has taken place.—(*Report of the Chamber of Commerce of Hanau.*)

Brazil (*The Watch and Clock Trade in the Province of Bahia*).—The trade in articles of a superior quality has only been insignificant, on account of their high price. In Bahia and in the interior of the province American clocks are sold, the cases of which are in common wood and often coarsely executed. Meanwhile, these clocks, favoured by their good going and low price, are preferred to similar articles of French make. American watches in nickel cases are of indifferent quality; the Swiss watches are generally preferred, which are constructed with more care.

These articles are sold at the following prices :—

	Reals.	Francs.
American striking clocks. 8 days	18.000 to 45.000	50.40 to 126.00
1 „	8.000 „ 12.000	22.40 „ 33.60
Swiss watches nickel cases	12.000 „ 18.000	33.60 „ 50.40
American „ „	12.000	33.60
Swiss, silver cases, principally keyless. . .	15.000 „ 30.000	42.00 „ 84.00

The Brazilian buyer seldom regards the finish and the artistic merit, but prefers cheap articles.

The importation and exportation are done by the interposition of commission agents or houses.

Germany, England and Italy send commercial travellers to Brazil. In addition, the Germans, English, and Americans send prospectuses translated into Portuguese and containing detailed explanations and engravings of the articles they wish to be bought.—(*Extract from the Report of the French Consul at Bahia.*)

Argentine Republic. (*Mode of Payment.*)—Favoured by the extension of the plantations of sugar-canes, this country has become richer, and the European traders should be able to create an opening with advantage. The payments are made at five months from date, not reckoning the month in which the business is concluded; it is important to hold to this custom, for those European houses which have endeavoured to forsake it, and to obtain quicker payment, have not been able to accomplish business.

Buenos Ayres.—Business here suffers from the influence of the European uneasiness. Each time that the manufactures of Europe are produced beyond the needs of consumption, the excess comes on our market, and, causes an encumbrance, of which the natural effect is a lowering of price. This state of things is sufficiently frequent to be considered as normal, and it must follow that European merchandise, notably manufactured goods, is constantly realised in our markets at a loss. It should be said as a "set off" that the consumption increases rapidly, and that foreign manufacturers find here a sale more and more considerable, and in direct proportion with the increase of the population.—(*Courrier de la Plata.*)

Japan. (*Importation of Watches at Yokohama.*)—The watch business has continued its backward movement during the last year. Although the importations have notably diminished on the year 1881, and the price is still worse, the stocks have not decreased; for while the importation has been less important, it is still in excess of the demand. It is the buyers of the interior who, above all, are in default, because the peasants are obliged to forego the luxury of a watch in consequence of the low price of rice. The fashion of large watches continues, while small sell but rarely, and often at a loss.

Watches and Clocks.—The Swiss supply nearly all the watches. Some small shipments have been made by France, Germany, and, above all, America (United States). In 1882, 50,362 clocks have been imported from America.—(*Extract from the Report of the Belgian Consul at Yokohama*).

Philippine Islands. (*Watches, Clocks, Jewellery, and Musical Instruments for Manilla.*)—The watch trade was but lately one of the most prosperous branches of the French importation. It now appears to us to have completely escaped. The English watch continues to be sold to a select class of customers, who pay a high price. Geneva supplies the middle classes with her productions, relatively good at the price; and America has introduced into Manilla, with the greatest success, common watches in nickel silver which are worth nothing, but which have a good appearance, and are sold at an extraordinarily low price. These various productions occupy the market, and do not appear to leave the least room for French articles. We can only recover from this decline by a sustained and energetic effort. The principal part of the clocks which are sold in Manilla come from Germany and Bohemia. If they still come from France, it is in a very small quantity.

Jewellery is one of the rare branches of importation where the French make yet occupies the first and the best rank. As regards quantity, less gold jewellery is imported from France than Germany, but that which is imported represents a value at least equivalent, because the French jewellery is of a superior quality gold, and better worked. France and Germany each sell fine jewellery to nearly the amount of 250,000 francs. As to imitation and gilt jewellery, of which shirt studs compose two thirds, the value imported is about 500,000 francs, of which four-fifths is of French make.

To sum up, out of an importation of real and imitation jewellery to the value of 1,000,000 francs, France sells about 650,000 francs, and Germany about 350,000. These figures without doubt are only approximations, but they may be taken as very near to the truth.

Musical Instruments.—This country is the most musical in the world. The people here have a truly extraordinary aptitude for instrumental music. There is not a village, even in the interior, which has not a "band" of music. The importation of musical instruments of all kinds is thus the object here of a very important trade. All brass and wind instruments come from France. A French house, making cheap articles, sends every year to the value of 150,000 to 200,000 francs. Stringed and wooden instruments come from Saxony. Every year in Manilla from sixty to eighty-five pianos and harmoniums are sold at the price of 1,500 to 2,000 francs, and this importation is on the increase. Nearly all are of German make, about half-a-dozen came from France, consigned by a Marseilles maker to a provision dealer.—(*Extract from the report of the French Consul in Manilla.*)

Turkey in Europe. (*Commercial Customs in Constantinople.*)—A writer says, in the *Kölnische Zeitung*, published in Constantinople, that merchants who wish to do business in this place ought to take the greatest precautions. Often, to save expense, they refuse to avail themselves of the services of commission agents established in the city, and deal direct with the Greek or Turkish houses. If a difficulty happens unexpectedly, and it is often the case, the shippers have no means of protection, the processes against a native are so long and expensive, that an agreement had better be made on any conditions. These differences make it necessary to employ a foreign representative; it would then be more advantageous to transact subsequent business through him.

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Swiss Watchmaking.

It is as nearly as possible three hundred years since the greatest of Swiss manufacturing industries began. Like the Swiss Reformation, it took its rise in Geneva, where the trade of the watchmaker was established in 1587, and spread thence to the neighbouring cantons of Neuchâtel, Berne, and Vaud. It is stated, however, that the first watch actually made in Neuchâtel was an imitation of an English one, which had somehow found its way into the country, and the constructor was an ingenious blacksmith. In Geneva itself the new industry spread with such rapidity that within a century of its introduction as many as one hundred master watchmakers had been established in the city, and 5,000 watches were annually turned out as the result of their united efforts. It was only about forty years ago that machinery began to be employed in Swiss watchmaking, though it had been introduced in America fifteen years earlier. It is not easy to ascertain to what extent it is in use at the present day. The Swiss like to have it understood that they prefer the handiwork of the craftsman, as of superior artistic excellence. It is, no doubt, used to a considerable extent, notwithstanding.

An interesting report has just been published by the Foreign Office, prepared by Mr. Conway Thornton, our Secretary of Legation at Berne, in which an attempt is made to give an account of the present state of the watchmaking industry in Switzerland. The materials do not exist, however, for a complete and perfectly accurate statement, either as to the number of watches produced, their value, or the number of persons employed in the manufacture. This is no doubt a misfortune for the manufacturers and their workpeople themselves, and has possibly, as Mr. Thornton suggests, something to do with the frequent crises in the trade. There is, in fact, no means of ascertaining the actual state of the market and of regulating production accordingly. The figures given may probably, however, be taken as approximately correct. According to Professor Thury, who wrote four years ago a pamphlet with the title of "Historical Notes on Swiss Watchmaking," the number of hands employed in the manufacture in 1866 (why no later date is given is not explained) was, in Neuchâtel, 13,706, turning out yearly about a million watches, of the value of 50,000,000 fr.; in the Jura Vaudois 2,700, and in the rest of the canton 5,000. In Berne there were about 1,300 workmen producing watches valued at about 30,000,000 fr. yearly. The manufacture is not carried on in other parts of the country to any large extent. In spite of the great competition of America, the Swiss watchmaker appears to hold his own very creditably. At the Vienna Exhibition of 1873 there were 76 Swiss exhibitors to 22 French, seven English, and no Americans. Germany and Austria sent no watches, but only clocks. From other countries there were only a few occasional horological eccentricities, such as one from Turkey, which consisted of a cabinet showing a carved clock with the inscription—"This clock once set in motion will go for ten years." Again, at the Philadelphia Exhibition of 1876, the Swiss defeated the Americans on their own ground. They sent 29 competitors, against 12 English, 13 French, and 17 German. The native American exhibitors numbered but 26, and of these several were owners of factories in Switzerland. On this occasion, however, it is stated the Americans were able to establish a decided superiority over the Swiss in the production of cheap watches and of watchmaking tools. Lastly, at the Paris Exhibition of 1878, the Swiss watchmakers again did well. The principal competitors against them were the makers in the Department of the Doubs, which sent 184 exhibitors, against 163 Swiss, all the rest of France contributing but 169. The manufacture in the Doubs is, however, of Swiss origin, having been established by political refugees from Neuchâtel in 1848. The estimated number of watches produced annually ten years ago in the whole of Switzerland was 1,600,000, the value being 88,000,000 fr., and the number of workmen employed in the production 37,969. About one-third of the workers are women. According to Dr. Adolph Hirsch, the Director of the Neuchâtel Observatory, who is responsible for these figures, about ten per cent. should be added to bring them up to the present day. As already stated, however, the returns lay no claim to more than approximate accuracy. This gentleman thinks that Switzerland may fairly claim the first rank among watch-producing countries, and may be regarded as at least the equal of England in respect of chronometers. American competition has had one bad effect upon the Swiss manufacture. It has led to the turning out of articles which Dr. Hirsch describes as "neither silver nor watches." A particular district in Neuchâtel has now an unenviable fame for the production of a particularly objectionable cheap watch. It is said that a composition is used in the manufacture of the "gold" and "silver" cases constructed for it which is of so highly explosive a character that an accidental blow on the waistcoat pocket of a man carrying one would produce a detonation of an alarming if not of a dangerous character.

The importance of the industry is recognised by the governments of the cantons in which it is established by the institution of horological schools for the instruction of young watchmakers. The first of these was founded exactly sixty years ago at Geneva. In 1843 it was constituted a municipal institution. It is directed by a committee of watchmakers, and includes both practical and theoretical classes. The theoretical course lasts four years. The fee for Swiss students is five francs a month. There are other similar schools at Chaux-de-Fonds, Locle, Neuchâtel, and Fleurier, as well as two in the canton of Berne, at St. Imier and Bienne. Besides these schools, there are different societies whose special object it is to promote the efficiency of the watch manufacture, and the Society of Arts at Geneva has its Section d'Horologerie, which publishes a monthly journal under the title of the *Journal Suisse d'Horologerie.* This society has lately issued the prospectus of a competition for chronometers as regards their regulation for varying temperatures. The observation is quoted of the English manufacturer, Mr. Dent, that a chronometer can be regulated for *two* temperatures, but that *between* these two temperatures it will gain, while above or below them it will lose. The object of the competition is to find some means of correcting this irregularity, but only Swiss instruments are eligible to compete. It is, however, says Mr. Thornton in his report, to the public observatories of Switzerland, particularly those of Geneva and Neuchâtel, that the Swiss watchmaker is mainly indebted for the precision which he has been enabled to reach. The Geneva Observatory was built in 1773, and restored in 1829, and since the latter date special arrangements have been made for testing and regulating the chronometers brought there for inspection. This observatory communicates by electricity the exact time to all the watch factories in the city. The Observatory at Neuchâtel, which was founded in 1858, lends assistance of a similar kind to the watchmakers of the town and district. A yearly competition of chronometers is held in each of these observatories, when prizes are given either by the Society of Arts or by the Government.—*The Globe.*

The Patents, Designs, and Trade Marks Act of 1883.

By C. Stuart Murray.

IN this paper I have passed by the subject of "Patent Law Reform Fifty Years Ago," in order to present a comprehensible outline of patent law to-day. The full title is, "An Act to amend and consolidate the Law relating to Patents for Inventions, Registration of Designs and of Trade Marks." It came into operation on the 1st of January last, as the "46 & 47 Victoria, chapter 57." It is divided into five parts, as follows:—namely, Preliminary, Patents, Designs, Trade Marks, and General. It repeals, wholly and partly, no fewer than twenty-three former statutes, and follows on the lines of the recommendations of the Committee of the House of Commons in 1871, whilst that, again, had to consider the then latest legislation—the Act of 1852. The new Act makes some sweeping changes in various ways, as will be seen further on.

Any person, whether a British subject or not, may make an application for a patent; or two or more persons may have an application allowed and a patent granted to them jointly. The form provides that the name, address, and calling of the inventor is to be written in, and the name or names of the inventor verified by a declaration of the truth of the statement contained in the application. There must be either a provisional or complete specification, accompanied by drawings, if required. The complete specification must also have drawings, and the nature of the invention must be particularly described by such drawings, if they are required. The fourth and fifth sections of the Act make important alterations in the law in this wise:—In order to have an application for a patent considered, the applicant, or one of the applicants, must be the true inventor. From this it will be seen that a heavy annihilating blow is struck at the system of importing inventions from abroad and patenting them. Nor can an agent apply for a grant of an invention that is "a communication from abroad," unless a declaration from the inventor accompanies the application. A workman-inventor may unite his employer with himself, and a shareholder in the intending patent may also apply. Long ago, however, it was laid down by the House of Lords that patentees are not partners, each being able to use the invention without liability to the others.

Every application is to be referred to an examiner, whose business it is to ascertain that the invention has been fairly described, the drawings and specification properly prepared, etc., and report to the comptroller. The comptroller may either refuse the application or require any amendment that he deems necessary, and so return the matter to the applicant. But there is an appeal from him to the law officer, who may hear the applicant and the comptroller, and determine between them; if accepted, the inventor will have due notice from such officer. If, before a patent has been sealed, some other person applies for a patent with a similar title, it will be the duty of the examiner to report to the comptroller about the similarity and give notice to the applicants. If the examiner reports that the specification comprises the same invention, the comptroller may refuse to seal the patent on the second person's application.

In the old law there was no examiner, that duty, or rather as much of it as they chose to exercise, being within the scope of the law officers. But now that special examiners have been appointed, as may be expected, matters will be carried out much more systematically and with far greater strictness. It will thus be seen that intending patentees cannot be too exact in the preparation of drawings and specifications; in fact, inventors cannot be too careful both in language and drawings with respect to their applications. A specification, either complete or incomplete, may be left with the application; if not so left, it must be furnished within nine months, or the application will be deemed to have been abandoned. In the case of leaving a complete specification after a provisional one, the comptroller shall have the power to refer both to an examiner, to report as to whether they are substantially the same. If they are not so, then he may refuse the complete one, and insist upon its being amended, subject to an appeal to the law officer. The law officer may hear both sides if they request it, and determine whether and subject to what conditions such complete specification shall be accepted. Unless it is accepted within twelve months from the date of application, then (save in the case of an appeal having been lodged against the refusal to accept) the application shall at the end of the twelve months become void. The reports of the examiners are not to be open to public inspection, not even liable to production in any way, in legal proceedings or otherwise, except under an appeal to the law officer under the Act, or the court or officer, having power to order discovery in such legal proceeding, shall certify that the production is desirable in the interests of justice and ought to be allowed.

When the complete specification has been accepted, the comptroller is to advertise its acceptance, and then both application and specification are to be open to public inspection, with any drawings that there may be. This proceeding will let searchers know for the first time in patent law the exact position of an application, and whether it stands upon clear ground or not, so far as other things of that kind are concerned. Opposition may come at any time within two months of the acceptance of a complete specification as notified by advertisement, the date of the advertisement fixing the beginning of the two months. The notice must be given at the Patent Office to oppose the grant upon the following grounds :—That the applicant for the patent has obtained the invention from the opponent, or from a person of whom such opponent is the legal representative, or that the invention has been previously patented in this country, or that an examiner has reported to the comptroller that the specification appears to comprise the same invention as is comprised in a specification of the same or similar title accompanying a previous application, *but on no other ground.* Where such opposition has been notified, the comptroller will inform the applicant, and shall at the end of the two months, after hearing the applicant and the opponent, decide on the case subject to the law officer. Upon the appeal the law officer is to determine whether the grant ought or ought not to be made. He may also obtain the assistance of an expert, who shall be paid by the Treasury.

If there is no opposition, or in case it is overthrown, the comptroller shall issue the patent sealed with the seal of the Patent Office, and such seal shall have the same effect in law as if sealed with the Great Seal of the United Kingdom. This is a great step forward, inasmuch as there will be no more petitioning tho Lord Chancellor to withhold the Great Seal, so that his power is ousted by the new law. The patent is to be sealed in the manner directed as soon as may be after the grant, and not after the expiration of fifteen months from the date of the application, with the under-mentioned exceptions :—

Where it has been delayed by the law officer, or by opposition to the grant; but it may be sealed at such time as he shall direct. Secondly, if the person making the application dies before the expiration of the fifteen months already named, then the patent may be granted to his legal representative, and sealed at any time within twelve months after the applicant's death. Here, again, is a material advance for the benefit of inventors, and also of their representatives, which cannot fail to be of great value.

Every patent shall be dated and sealed as of the day of the application; provided that no proceedings shall be taken in respect of an infringement committed before the publication of the complete specification; and provided also that, in case of more than one application for a patent for the same invention, the sealing of a patent on one of those applications shall not prevent the sealing of a patent on an earlier application.

This section requires a little explanation. It means that where an inventor has made the first application, and has passed through all the stages except that of obtaining the seal, and during the delay a second applicant applies for another patent for the same invention, and proceeds forthwith and obtains the seal, the first applicant is not ousted, but may also obtain the seal himself, as if no one had taken it before him. It would appear that where proceedings had been taken in respect to an infringement before the publication of the complete specification by the first applicant, that such proceedings delayed the sealing, but that notwithstanding such delay, and although the second applicant had obtained his seal for the same invention, the first applicant could also obtain his, and that both could hold and work the same invention independent of each other. It must be a good patent that would be worth all that; besides, it is generally thought that the first patent that gains the seal clears the course of all rivals in respect to that invention. However, the lawyers will tell us that that is not so; it was the old law, and is incorporated in the new.

We now come to provisional protection. Where an application for a patent in respect to an invention *has been accepted*, the invention may, during the period between the date of the application and the date of sealing such patent, be used and published *without prejudice to the patent to be granted for the same.* This is a very important provision on the side of the inventor, as it puts an end to patent-piracy as formerly effected, by getting hold surreptitiously of the principal points in a forthcoming patent, and thereby robbing the rightful owner on the journey to secure his own. Such security is in the new Act referred to as "provisional prosection." Following upon this is the effect of complete tpecification. After the acceptance of a complete specification, and until the date of the sealing of the patent, or the expiration of the time for sealing, the applicant shall have all the rights and privileges as if the patent had been sealed on the date of the acceptance of the complete specification; but he will not be entitled to institute any proceedings for infringement until the full patent has been granted to him.

Every patent, when sealed, will have effect throughout the United Kingdom and the Isle of Man, that is to say in England, Scotland, and Wales. In the new law, however, inventors will have to protect themselves in the Channel Islands, such as Jersey, Guernsey, Alderney, Sark, etc., as the Act does not take these islands in. I shall come to Ireland in due course. The term of a patent is limited in duration to fourteen years from the date of its being sealed. But it will be well to take note that, notwithstanding anything in the Act, the patent will cease if the patentee fails to make the prescribed payments at the times set forth. The amount and method of making the payments will be found towards the conclusion of the present abstract. If, however, in any case, by accident, mistake, or misadventure, a patentee fails to make any payment within the prescribed time, he may apply to the comptroller for an enlargement of such time in which to make his payment. If the comptroller is satisfied that the failure has arisen from any of the causes mentioned, above he shall enlarge such time upon the payment by the patentee of a fee of ten pounds, subject to the following conditions :—

(*a*) The time for making any payment shall not in any case be enlarged for more than three months.

(*b*) If any proceeding shall be taken in respect of an infringement of the patent committed after a failure to make any payment within the prescribed time and before the enlargement thereof, tho court before which the proceeding is proposed to be taken may, if it shall think fit, refuse to award or give any damages in respect of such infringement.

Amendment of Specification.—An applicant or a patentee may, from time to time, by request in writing left at the Patent Office, seek leave to amend his specification, including drawings forming part of it, by way of disclaimer, correction, or explanation, stating the nature of the amendment and his reasons for the alteration. All this will have to be advertised as may be directed in the case, and within one month from the first appearance of the advertisement any person may give notice at the Patent Office of opposition thereto. The comptroller will then give the patentee notice of this opposition, when the patentee and the opponent will both appear before him for a decision, and state whether and upon what conditions, or not, the amendment ought to be allowed. Should there be no opposition, or the person opposing does not put in an appearance, the comptroller will still determine about the amendment. On both sides of the argument the parties can appeal to the law officer, who will hear them as in difference against the comptroller, and may make such order as to him, the law officer, shall seem to meet the justice of the case. But no amendment will be allowed that will tend to make the specification as amended claim an invention that may be either substantially larger than or substantially different from what it was before any amendment was allowed. And here is a very important conclusion to this part of the law. It is this:—Leave to amend shall be conclusive as to the *right* of the party to make the amendment allowed, except in case of fraud; and the amendment shall *in all courts and for all purposes be deemed to form part of the specification.* It must, however, be borne in mind that those saving clauses do not apply so long as any action for infringement or other legal proceeding in relation to a patent is pending. That is very necessary to be borne in mind by the patentee.

In an action for an infringement of a patent, and in a proceeding for a revocation of of a patent, the Court or a judge may at any time order that the patentee shall, subject to such terms as to costs and otherwise as the Court or a judge may impose, be at liberty to apply at the Patent Office for leave to amend his specification by way of disclaimer, and may direct, that in the meantime the trial or hearing of the action shall be postponed. This privilege did not exist in any previous patent law, and its importance cannot be fully approciated until actual experience has given weight to it. Where an amendment by way of disclaimer, correction, or explanation, has been allowed, no damages shall be given in any action in respect of the use of the invention *before* the disclaimer, correction, or explanation, unless the patentee proves that his original claim was made in good faith and with reasonable skill and knowledge. This clearly points to the inventor employing some professional assistance in the shape of a patent law-agent; that is, a man who is versed in the practice of patent-law contention. There is no one who will have to be more cautious than the inventor in not having a fool for his client; that is, in not being his own patent-law agent. When we embark upon infringements we soon discover ourselves afloat upon the stormy sea, and among the rocks and shallows of this peculiar kind of warfare. It is surprising how fond women are of "fetching law." I once heard of a lady who estimated the worth of a husband after this fashion:—"I wouldn't give a button for a man who had not the pluck to patent my hairpin and then bring actions for its infringement." It is to be hoped that there are not many strong-minded dames of that "celestial" mould. Every amendment must be advertised in the manner laid down by the comptroller.

The next feature is the compulsory license, which is also entirely new, and will not be agreeable to many inventors. The object of it is to abolish a long and loudly denounced evil; namely, that of the "dog-in-tho-manger" kind, of which all persons who have had any connection with manufactures have had experience.

If on the petition of any person interested, it is proved to the Board of Trade that, by reason of the default of a patentee to grant licenses on reasonable terms—(*a*) the patent is not being worked in the United Kingdom; or (*b*) the reasononable requirements of the public with respect to the invention cannot be supplied; or (*c*) any person is prevented from working or using to the least advantage an invention of which he is possessed, the Board may order the patentee to grant licenses on such terms as to the amount of royalties, security for payment, or otherwise, as the Board, having regard to the nature of the invention and the circumstances of the case, may deem just, and any such order may be enforced by mandamus. By this it will be seen that a patent will be no longer allowed to lie dead, either through obstinacy, idleness, or otherwise. It must be worked by any one who will comply with the conditions of the Board of Trade, when the inventor either will not or cannot work it himself. This is also quite new in patent law.

(*To be continued.*)

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Taxation of Gold and Silver Plate.

The committee of the Gold and Silver trade section of the London Chamber of Commerce has just issued a circular to members of the trade in London and the provinces, inviting them to express their opinions as to the rebate which they would require on their stocks, in the event of the duty on gold and silver plate being abolished. From time to time, memorials and petitions with this object in view have been presented to the Government by members of the trade, and both the past and present Chancellors of the Exchequer have admitted that the abolition of the tax was very desirable in the interests of the trade as a whole, but this could not be carried out owing to the difficulty of any agreement as to the amount of the drawback to be allowed to the trade on "stocks." Sooner or later, it is felt that the duty must be repealed; and hence it is necessary to arrive at a practical basis on which a satisfactory drawback can be demanded, and on which it might be possible to enforce what Mr. Childers himself considers as "a just claim." In view of this necessity, and of the recent issue of Parliamentary Papers, containing the views of the Indian Government and the commercial community of India, and other authorities on the silver question, the Gold and Silver Trade section of the London Chamber (with the sanction of the Council) have addressed confidentially to the trade the following series of questions, which, if answered in the spirit in which they have been drafted, will greatly assist them in laying their views before the Chancellor of the Exchequer in such a manner as to facilitate the abolition of the duty without detriment to any of the interests affected by it.

1. Upon the manufactures in stock, how many years' date do you think drawback should be allowed?
2. Taking the above as the basis of your answer, at about how much may we take your claim?
3. State how much for gold and silver separately.
4. In the event of Government allowing only on goods manufacturod during the last three years, could you say what your claim would be for this period?

English Duties on Gold and Silver Plate.

Their special Injustice as affecting the Indian Silver Craftsman.

As announced in our last issue, a paper on the above subject was read to the members of the East India Association, on the 28th ult., by C. McKay Smith, Esq. The author has kindly forwarded us a full report, but we have taken the liberty of omitting certain parts which have already been dealt with by him in our columns.

"In October last I read a paper on 'The Taxation of Gold and Silver Plate' before the Social Science Congress at Huddersfield, in which I advocated its total repeal. I was not then aware of the strong interest evinced in the question from the point of view of the Indian silver-craftsman. But the Parliamentary Paper (No. 347) published last month shows that the subject has been thoroughly mastered by the representative members of the trade in the various Presidencies; that they have exhibited their competency to expose in befitting terms the folly as well as the injustice of the existing system; and that those more directly responsible for the administration of our great Indian dependency, both in Calcutta and London, are disposed to give them active, generous and intelligent support.

"These taxes, and more especially as regards their effect on the silversmith's craft, are inconsistent with views of political economy, the soundness of which, in this country at all events, has long since ceased to be contested. Indeed the Lords Commissioners of Her Majesty's Treasury, in the correspondence now published, make no effort to contest them, but at the same time, for reasons incomprehensible to the lay mind, they decline to give practical effect to their tacit admission. It is a slow and laborious process working on them through the influence of outside opinion. It is a process in the intelligent operation of which I have personally no longer any belief; but as some gentlemen, in every way entitled to my respect, have paid me the compliment of representing to me that these lines may serve a useful purpose in connection with their most legitimate agitation on behalf of the duties on plate, I have consented to prepare them. In extracting from a little work already issued by me, entitled 'The Taxation of Gold and Silver Plate,' I run no risk of wearying you so far as mere repetition can have that effect. Fifteen copies of it have been sold, of which probably about three have been read.* So that, divided among the four million people of this city, the proportion of that literary repast, which may have already percolated to this audience would be represented by a fraction intelligible only to the homœopathist.

"The tax on gold and silver plate stands out as the one relic left to us of protective legislation; the solitary remnant of that mass of foolishness, which it has been the just pride of our free institutions to have obliterated from the statute law of the country during the last half-century. It is in reality a double tax. One portion of it contributes to the public revenue, and amounts to eighteenpence per ounce upon finished silver plate; another portion of it is paid to Goldsmiths' Hall in London, and to authorized assay offices established in some provincial towns, as an equivalent for assaying and hall-marking, and runs (as far as I can gather) from about a penny to twopence per ounce. I claim to term this latter a tax equally with the larger payment, inasmuch as it is levied under the authority of an Act of Parliament, and there is no choice but to submit to it.

"The object of my paper is to contend that every consideration of an enlightened public policy demonstrates the necessity of abolishing this double tax.

"The theory of government, which prevailed in our earlier history, was one in virtue of which it was an obligation upon the ruler to interfere with every petty detail of trade. In the sixteenth century, for example, it was the province of trade guilds in England, acting under plenary sanction 'to see that no person undertook to supply articles which he had not been educated to manufacture; to determine the prices at which such articles might justly be sold; above all, to take care that the common people really bought at shops and stalls what they supposed themselves to be buying; that cloth put up for sale was true cloth, of true texture and full weight; that leather was sound and well tanned, wine pure, measures honest, &c.' Much may perhaps be said in favour of this paternal view of the functions of government. Reinstate them if you like, but at all events be consistent. If I am still in my political infancy, why leave me exposed to the wiles of those who seek to beguile me with shoddy for trousers, or with sherry from the luxuriant vineries of Hamburg? If, on the other hand, I am presumed to have reached to years of discretion, why trouble yourselves in the matter of my spoons and forks? Why not let me make my own bargain for them in my own way as you permit me to do in everything else?*

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"Select Parliamentary Committees have sat on this question—sat on it, I may say, in every sense of the term—at intervals since 1856 inclusive. The evidence taken by that which met in 1878-79 may be fairly said to have been exhaustive. The disappointing feature in connection with it is that it exhibits the leading English silversmiths, with some few eminent exceptions, as vehement upon the side of upholding the restrictions upon the trade against which it is the purpose of this paper to protest, and, as might be expected, the evidence given on behalf of Goldsmiths' Hall was in the same vein. There is no profit gained by the authorities of Goldsmiths' Hall from the charge made for assaying and hall-marking, as the fees do not more than cover the necessary expenses, but this circumstance does not seem to lessen the tenacity with which they cling to their ancient privilege.

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"The effect of the existing restrictive laws upon the English workman is in truth a paralyzing one. In other trades, and in dull times, the masters employ their own capital and the labour of their men in working to stock; but the master-silversmiths—and who can blame them?—work little or nothing to stock with at all events the possibility before them of these taxes being abolished. A necessary consequence of the existing system is, that the operative silver-worker is engaged in a spasmodic and intermittent fashion fatal to that fine touch of supreme excellence, which is alone the fruit of steady and habitual employment. Let us suppose the gunsmiths, glass cutters, cotton spinners, woollen weavers, and twenty other leading industries, to be worked under like conditions: how long would these trades hold together, or before the grass began to grow in the streets of our great manufacturing towns?

"Brave words—words only—have been uttered against abuses, actual or alleged, of which the City Livery Companies are supposed to be the corporate embodiment. Into any larger question, affecting them or their concerns, this is not the place to enter. But it seems almost a miracle in the way of incongruity, that the Goldsmiths' Company should appear as the willing instrument of the law in preying upon the vitals of an apparently doomed industry, the true interests of which one would think it their highest privilege to conserve and defend. The belief is that, but for the great although undemonstrative influence of this powerful guild, both duty and hall-marking would long ago in nautical parlance, have 'gone by the board.'

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* Very little more success attended the sale of a pamphlet published in 1880, advocating the opposite side of the question, which we regard as a proof that the public take little interest in it.—Ed.]

* See "Tax on Manufactured Silver," *W. J. & S.*, September, 1883, page 42.

"That, with some notable exceptions, the masters and dealers were, as judged by their evidence, on the side of a rigid adhorence to the existing policy of restriction is, as I have already remarked, perhaps disappointing, but it is after all only the old story repeated. Each trade, as its turn came for emancipation, stood, as we all know, hesitating and shivering on the brink of that cold-water bath of freedom into which—not to their subsequent sorrow—they had perforce to plunge. All were straightway to bo ruined. The abolition of the Navigation laws was to complete the business by the annihilation of our shipping—almost a superfluous task when there were to have been no goods to carry. I hope to live long enough to enable me to congratulate English silversmiths upon being ruined in precisely the same degree as most of these others. I only hope they will not wait for the completed result to present me with that silver tea-service which I am trying to earn at their hands as soon as they can make me one without the necessity of a hall-mark or duty-punch being stamped upon it. From the point of view of an intelligent regard for their own welfare the master-silversmiths would find that in enlisting themselves on the side of the removal of the restrictions upon their trade there would be no conflict between their interests as craftsmen and as citizens; but if they cannot be madé to see this, they must simply be asked, like their predecessors in affliction, to stand aside and not any longer block the way.

"I have not touched upon the duty of 17s. per oz. on gold plate. For obvious reasons the considerations involved in it are of much narrower importance than those which arise in connection with the duty on silver. If the silver duties are abolished, the other must necossarily follow. But if an instructive comment were needed upon the contention that Goldsmiths' Hall is our last refuge against the debasement of our plate, it may be found in the fact that they will stamp the hall-mark, as indeed the law requires them, upon gold goods of as low a quality as 9 carats—standard being represented by 22. In other words, they will accord the high privilege of this honourable and ancient device to gold plate of which about 13 parts out of 22 may consist of copper or other baser metal. To ordinary minds it would almost seem as if we had here reached that point in the argument known as the 'reduction to the absurd.'

"There are supremely important aspects of this question, apart from the one which I have had more immediately in view. Silver is the currency of our Indian Empire, and the increasing supply of raw silver of late years has had the serious effect of gradually depreciating that currency. This is a kind of thing which has a strong tendency towards gradual self-rectification if left to nature; but what our governing people do, is to artificially check this healthy corrective influence by placing restrictions upon that increased application of silver to trade uses which it is believed would largely contribute to the desired effect. The correspondence now published by order of Parliament makes it clear that the obstacles placed by legislation in the way of imports to this country of the characteristic and often beautiful silver goods of the Indian craftsman are keenly felt in India, and that their removal would be hailed there as a most welcome boon. Tho capacity of the Indian silver-worker is not to be rightly judged by the flimsy 'fop-tackle' with which most of us are familiar, and which the law permits to come in duty-free. It will be seen what he can do when at his best as soon as there is a free market open to him for all that he can produce.

"The principles on which the repeal of these duties is demanded are of universal application unless the whole scheme of our economic legislation of the last thirty years is to be regarded as an admitted mistake; and to a certain extent the statement of the case is impoverished by laying too much stress on the argument from the Indian standpoint. Where proposed alterations in the law, dictated by sentiment only, come into conflict with legitimate deductions from accepted economic truths, it would be but a futile kindness to allow them to prevail. But in this application from our Indian fellow-subjects to be admitted to the freedom of our market for one of their characteristic products, they merely ask us to vindicate our own principles; and in refusing it the Lords Commissioners of the Treasury show an incompetency to measure the effect of a graceful concession to a subject people which seems completely deplorable to any one competent to estimate the value of sympathy as a moral force in the government of such a dependency as that of India. There is a becoming congruity in all things which even 'my lords' are not privileged to violate with impunity. Whether they are the originators of their attitude of obstruction, or whether they merely permit themselves to be the mouthpiece of the Government in this matter, is a distinction which I have no means of estimating; but be it the one or the other, there is only one phrase possible to think of in connection with a set of persons capable of informing the Secretary of State for India, under the hand of Mr. Leonard Courtney, in March, 1883, that 'the financial equlibrium of the Budget must be a primary consideration with the Imperial Government' before they can repeal this paltry yet most mischievous tax; and of submitting a month or two later a scheme to Parliament and the country for the reduction of the National Debt by about £100,000,000, almost within the current century.

"It is of the greatest possible consequence to allow free play to any natural disposition on the part of our Indian fellow-subjects to multiply the range of their avocations, and to develop strata in their social scheme other than those directly dependent on the cultivation of the soil. I am no believer in promoting any such disposition by artificial devices. But here all that is asked is that obstructions which are our own creation may be removed, and that the stimulus of a free market may be given to the higher development of the silversmiths' craft among a people very distinctively possessed of the artistic and creative instinct, and who inherit the art faculty as a matter of tradition and inheritance from a remote past.

"In Calcutta there is now open a great International Exhibition. The wares of all the world are no doubt there, but it will surprise me to find that the English silversmiths exhibit very conspicuously. If they pay duty before their goods leave here and the things are afterwards sold in Calcutta, such payment is to them absolute wasto. If they have shipped their goods under drawback they must have done so subject to all the dangers and irritations of the process at the docks to which I have already referred, and failing to find a market abroad, their goods on re-entry have to pay the usual duty. And if there were to be an exhibition of silver goods in England a like set of obstacles would operate to prevent Indian or foreign exhibits being sent here.

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"The Imperial Parliament is always very ready to empty itself when an Indian debate is before it. If independent members can persuade themselves that they owe something to India for past neglect, here is an opportunity for them to discharge their consciences. In this question of the taxation of silver plate there is involved an Indian grievance ready to their hand, the conditions of which aro simple, compact and easy to be grasped. Let them make it clear to the Barnacle mind that the timo for 'my lords' to trifle over the subject in phrases of polite frigidity has gone by, and that the complete emancipation of the trade in plate is the thing that has to get itself accomplished."

Correspondence Column.

ENGLISH AND AMERICAN WATCHES.

TO THE EDITOR OF THE "WATCHMAKER, JEWELLER, AND SILVERSMITH."

Sir,—In reply to the letter signed E. H. M., published in your February number, I think there might be a fuller explanation of the manufacture of the two watches mentioned. With respect to tricks in trade, foreign movements being placed in hall-marked cases, I cannot think any retail shopkeeper would pronounce them English watches, as he need not be ashamed to sell a Geneva horizontal, as I think it is the universal watch of the country. It being so simple in its escapement and going barrel, it cannot be put much out of order by inexperienced workmen, and, if in anything like condition, it times wonderfully well for a cheap watch. As we know, there is rubbish made of the kind, and I am sorry to complain of many English watches in that respect. With regard to the gold horizontal being one of the two watches mentioned, and said to have been in wear over sixty years, and as good as when first sold, with the exception of the seconds pivot, I cannot but think this would be a Geneva horizontal. Having had a large repairing trade for the past fifteen years, I have had many English horizontals through my hands, but could never get any reasonable time from them, without replacing the cylinder, as the escape wheel had been raised and lowered, and cut the cylinder in several places, in apparently quite modern watches which, no doubt, is owing to the brass escape wheel, as we do not experience much of it in Genevas with steel wheels. With regard to the other watch, the modern American lever in English cases, I must say that I do not think it could have been either the Elgin or Waltham, which are undoubtedly thorough-good sound watches, the Waltham, even to the cheapest they make, in material, depths, construction, and freedom throughout the movement being so good and simple that it is a pleasure to clean and repair them. I have heard English manufacturers complain of the powerful mainspring they require, which I can safely contradict, as I frequently replace them by verge springs, which are known to be the weakest known for the width, and find it sufficient for them. I maintain, the Waltham cannot be improved upon a very great deal. It would be a pleasure to see the English revive, and make something similar at much the same price, if it only be one special watch, say a good gentleman's size, which there is no doubt a great demand for.

By adding the fusee, which is much more costly, and but one slight point gained, many evils are produced which are not necessary to mention; in fact, I consider the fusee stop-work and maintaining power, together with the delicate clickwork requires as great skill and workmanship as the remaining part of the watch.

Hoping we may soon have a good, sound English machine-made going barrel watch, produced at a reasonable price.

I am, Sir, your obedient Servant,
J. Brittain.
28, Goose-gate, Nottingham.

[The gold horizontal watch, referred to by E. H. M., may be fairly assumed to have been English make. Steel escape wheels were generally used for the best class of such watches fifty years ago, and cost from 15s. to 20s. Our present correspondent seems desirous of recommending Elgin and Waltham watches, more especially the latter, and in fairness we place his statements before our readers. At the same time it is well known that the faults in the "modern American lever in English cases" are to be found in both English and Swiss watches of the same construction and price. If watches are required to last a "lifetime," the work must be adequately paid for.—Ed.]

Improvements in Watches.

Patented by Gustav Speckhart, Nuremberg.

This invention is designed to effect the winding up of the mainspring and any desired adjustment of the watch hands without the use of a key or tho opening of the case, thereby also rendering the case much simpler and cheaper in construction.

This is effected by the use of sliding push or pull buttons or knobs, inserted through the central circumference of the case and communicating with the mainspring arbor or axis, and with the arbor or axis of the hands by suitable mechanism as hereinafter more fully described.

First: to effect the winding up of the mainspring.

A push knob through the exterior case is connected by a link with a lever, which is free to move on the arbor or axis of the mainspring case. To a square on this same axis is fixed an ordinary ratchet wheel with teeth arranged so as to gear with a pawl on the before-described lever, in the proper direction for winding up.

The pawl is kept in contact with the said ratchet teeth by a suitable spring, and a second fixed pawl and spring also engages into the ratchet wheel to check and hold it after a stroke by the described rocking lever.

A spring also presses against a projecting end of the rocking lever, so as to bring it back into its former position after a stroke from the push knob.

The movement of the rocking lever actuated by the push knob and its recoil by the spring effect, with the checking action of the second pawl, the winding up of the main spring.

A second knob placed by preference on the other side of the ring attachment and actuated by a pull, operates the hand-mechanism.

In this case the pull knob is provided with a ratchet hook at its inner end, which gears direct into the teeth of a ratchet wheel, keyed to the arbor or axis of the hand mechanism. This pull is provided with a slot working over two set-screws so as to be guided in its travel. It is raised by a pull to turn the hand-mechanism, and is pressed back into its former position after the stroke by a reacting spring.

This system of sliding pull and spring recoil may be used alternatively to the before described push knob, to effect the winding up of the main spring.

Alternatively a double push arrangement with two knobs projecting from opposite sides of the case may be used to actuate the hand-mechanism as it can be adapted to rotate the hands in opposite directions as desired.

To the two knobs a sliding carriage is attached, to which are fixed two spring pawls, one on each side of the wheel, to operate the watch hands. This wheel is provided with square ratchet teeth, so that either spring pawl will engage into the wheel according to the direction in which the sliding piece is pushed. The pawl, in rotating the wheel, passes under it, and then slides back freely over the teeth. Two springs are used to press the sliding piece back into its original position after movement from either side.

Owing to absence in this arrangement of any necessity for opening the cases either to wind up the watch or to adjust the hands, the case may be fitted, stamped, spun or pressed together in suitable parts, without the introduction of hinged glass ring and back cover as at present.

The case may alternatively be made either of the central ring and glass groove in one piece with a separate back cover; or the back cover and central ring in one piece with a separate glass groove; or the central ring, the back cover, and the glass groove all in separate pieces,—which may be fitted, stamped, spun or pressed together in any known manner. The ring attachment may be riveted, soldered, or otherwise conveniently attached to the central ring case.

Trade Notes.

A dinner in aid of the funds of the Clock and Watch Makers' Asylum, New Southgate, will take place on Friday the 18th inst., at the "Albion" Tavern, Aldersgate-street. The Right Hon. R. N. Fowler, M.P., Lord Mayor of London, will take the chair, supported by the sheriffs and a large number of influential gentlemen. Tickets 21s. each, which may be obtained at the Society's offices, 33, Northampton-square, E.C.

The annual meeting of the Watch and Clock Makers' Pension Society will be held at the British Horological Institute on Monday evening, the 28th inst., when the election of a male pensioner will be proceeded with. An unusual number of pressing cases are occupying the attention of the committee, and it is to be regretted that the funds at their disposal do not admit of two or even three being elected.

Mr. H. Ganney read a paper at the British Horological Institute, on the 25th ult., entitled "Machine Watchmaking as carried on in London." The paper announced to be read by the Editor, in another place, on the 21st, was postponed to meet the convenience of other members of the society.

The following incident was recently recorded in the *Christian World.* It often happens that the clock in a place of worship is supplied by a member of the congregation. The feelings of the unfortunate maker of this one, if present, may be easier imagined than described.

"On Sunday evening last a large congregation in the Wadebridge Wesleyan Chapel were startled during the sermon by hearing a loud noise in the gallery, followed by a whirring sound. The people below rushed for the doors, and those in the gallery broke the windows, and got on to an adjoining building. Several women were hurt in the struggle, and cries were raised that the gallery was falling. The preacher was blind, and, being forgotten, remained in the pulpit until the people returned, when it was found that the noise had been caused *by the slipping of the mainspring of the clock.*"

Sir John Bennett, writing to the *Daily Chronicle* on School Board Expenditure, says:—"Now, if instruction costs much, I venture to assert that our national ignorance costs very much more. We have driven away some twenty-five branches of English manufacture. As a watchmaker I know that the million of money that ought to be put in the pockets of our men and women mechanics of London every year, are sent over to the Swiss watchmakers, not only to fill English pockets with better and cheaper watches than we can make, but unfortunately theirs are the watches now exported all over the world by our English merchants as well as foreign agencies. Our only hope for the power to stay this deplorable and enormous loss of English superiority lies in an educational system that shall train and instruct our artisans at home as fully as do other countries everywhere, among our rivals abroad."

I see that hall-marking is not a very profitable business to the Goldsmiths' Company. The profit of the assay office in 1876 amounted to £4. In 1871 there was a loss of £84; 1872, £33; 1873, £14; 1874, £15; 1875, £17; 1877, £51; 1878, £77; 1879, £133; and in 1880 the loss amounted to £182. Total profit in ten years £4; total loss £606. I wonder they do not retire from the trade. ("Vigilant," in *Clerkenwell Press.*)

The Directors of the Crystal Palace Company, London, will hold at the Crystal Palace an International Exhibition of Arts, Manufactures, and Scientific, Agricultural, and Industrial Products. The exhibition is announced to open on the 23rd inst., and will be kept open for a period of six months from the date of opening.

An International Exhibition of Gold and Silver Smiths' Works, Jewellery, and Bronzes is also to be held in 1885, from 15th June, to 30th September, in the venerable town of Nuremberg, which is so inseparable from the history of Horology. The purpose of the exhibition, as stated in the programme is to set forth the present condition of gold and silver smiths' works, jewellery, and bronzes in the different countries; to call attention to the artistic and technical progress in their production; to give exhibitors an opportunity of extending their present and opening up new fields of consumption; and to promote emulation and advance by presentation of the newest machines, tools, apparatus, and raw-stuffs. Preliminary applications should be made by 1st June, 1884, to the Director of the "Bayrisches Gewerbemuseum," Nuremberg.

Russian Art Treasures.—A correspondent of the *Athenæum* writes:—"The remarkable collection of reproduction of Russian art treasures in metal and other materials, which has been made by permission of the late Emperor of Russia for the Museum at South Kensington, will shortly be exhibited to the public. Included in it are many pieces of English plate of curious interest to those familiar with the history of our manufactures. The most striking of these is a great silver wine cistern, of must unusual dimensions, about 5½ ft. long and massive in proportion, the original weighing more than a quarter of a ton, and being made of the higher or 'Britannia' standard. It stands on couchant leopards, and is decorated in repoussé with groups of young bacchanals, gracefully designed, playing round cars drawn by leopards, and the edge is wreathed with vine leaves and grapes. The original forms part of the treasure of the plate-room in the Hermitage Palace at St. Petersburg, and is certainly one of the most remarkable pieces of English plate known to exist. It is hall-marked 1734-5; but besides the hall-mark there is tho maker's mark, a shield bearing a mitre and the letters K. A. beneath. This has now been identified by Mr. Henry Rollason, of Messrs. Elkington's, as the mark, specially registered for plate of the Britannia standard, of Charles Kandler, who carried on business in St. Martin's-lane in 1727, and afterwards in Jermyn-street, near St. James's Church. There is a large contemporary engraving of this great piece of silversmith's work, bearing the name 'Henricus Jernegan Londini inuenit, 1735,' and the weight 'octo millium unciarum,' with the dimensions. Nothing of its history seems to be known in Russia, nor was it, until selected by Englishmen for reproduction, suspected to have been made in London."

Messrs. John Smith & Sons, turret clock makers, of Derby, have just erected in Churcham Church, near Gloucester, a large clock which strikes the hours upon a 17-cwt. bell, chimes the quarters, and shows time upon a five-feet dial. The same firm have also just made a large clock for Broughton Church, near Northampton. Both clocks have all the latest improvements, and are constructed after the designs recommended by Sir Edmund Beckett, Bart., Q.C. They are not expected to vary more than two or three seconds in a week.

A large clock has just been erected in the United Presbyterian Church, Kincardine-on-Forth, by Messrs. R. and H. Millar, of Edinburgh. It has four illuminated dials, 5 feet in diameter, cast-iron skeleton frames, glazed with opal glass, and strikes the hour on a large bell; it is also fitted with all the latest improvements.

The Taxation of Silver Plate.

The *Pall Mall Gazette* publishes the following:—

"We have received the following plea for the abolition of the silver duty from a working man engaged in the silver trade:—

"How long will the Government continue to halt between two opinions—that the claim for the abolition of the silver duty is a just one, and should be attended to, but that it is inexpedient to do so by paying the not very large sum demanded as drawback by the trade? The Chancellor of the Exchequer says he will not relieve the rich folk who purchase solid silver plate at the expense of the whole tax-paying community; a very good reason, perhaps, if that were the only outcome of the question. But what has he to say about the large body of artists and artisans who have, at the expense of long study and binding apprenticeships, qualified themselves for following the silversmith's calling, and who are now without work, and without work mainly because of a fiscal arrangent which produces small revenue to the country at large, but sadly short commons for the workers in taxed silver? Not long since the Premier, in answering an address presented to him along with a gift of Crown Derby china, dilated somewhat fully on the pottery trade, its history and present position among the industries of England, claiming that this country has been the first in which this elegant art had reached to the highest excellence without State aid. An assertion so comprehensive as this, from so competent an authority, naturally sets one to enquiring, What are the conditions under which the makers of the various kinds of pottery, and the varieties are almost innumerable, carry on their manufacture, so as to have attained for themselves the high position claimed by Mr. Gladstone, not only in the home trade, but also in the open markets of the whole world? Are arrangements in force by which they are protected from competition, and rival manufactures kept at a safe distance? By no means; they have to work against free imports from every spot on the surface of the globe where they can spin a potter's wheel or paint an earthenware pipkin. And those countries in the East, the mention of whose silver-work seems to send a cold shiver through the trade, are welcome to send their most enticing fictile wares for sale in open market among us. India, Persia, China, Japan—all contribute freely to our choice of fancy pottery, but they do not even menace, far less destroy, the demand for our own home productions.

"Take the history of the very factory in which the present of the Derby working men to Mr. Gladstone was made. Crown Derby China, like Chippendale and Sheraton furniture or Queen Anne plate, had for a long time been looked upon as an auction-room curiosity. The old factory at Derby had dwindled to a very small establishment, its chief business being the matching of old services of china in the possession of families throughout the country. The growth of a taste for various wares in imitation of those produced last century was taken advantage of about seven years ago by persons well conversant with the requirements of the trade, who had abundant capital to work it, and who succeeded in purchasing a right to imprint the well-known trade mark. They have gradually and steadily worked their way into the front rank, each year's productions being in advance of its predecessor in the quality and decoration of their work. Two years ago the company engaged as their art director a gentleman who is well known both at South Kensington and Goldsmith's Hall. Mr. Richard Lunn, originally a silver engraver in Sheffield, and a zealous student of art, both in its history and practice, whose knowledge is as minute as it is extensive, takes entire charge of the decorative department at the Derby China Works, with results which prove the good judgment exercised in the selection of one so competent. The productions of the company are in great demand in America. Vases and other ornamental articles of the most gorgeous and costly character are exported to that market in increasing numbers, and the builders are in oft-repeated request to enlarge premises which already accommodate three and four hundred workpeople. Mr. Lunn and one of his most practical assistants have both been drawn away from the silver trade, in which they found small return for the time they had spent in the effort to make themselves useful in it.

"Mintons, Doultons, Copelands, and many others throughout the country, are continually advancing in novelty and excellence of production. As Sir T. Farrer told the House of Commons Committee on the Plate Duties and Hall-marking, "You do not know what you may hinder by maintaining obsolete and worthless restrictions on a trade." Experiments, risky and costly, are continually being made by the potters, new materials are brought in, and new combinations of the old ones are continually being tried. But would the manufacturers undertake them with the fear of a Goldsmiths' Hall before their eyes? Not likely indeed! Instead of old trades springing into renewed life, we should find old and highly reputable factories shutting up or passing into other hands, the whole capital having been dissipated by the wasting effects of an ever-decreasing demand. Let the upholders of things as they are tell us how low the trade must go down before they will be able to see the need for a change. They have had their way for long enough to test its effects. Suppose we try a change now. It is not easy to imagine one for the worse. All sound reason, all experience, in this country point to freedom from ill-judged restrictions as the first condition needed for the successful development of a manufacture. Restricted silver and unrestricted pottery are at the opposite ends in the scale of prosperity, one being an honour and a profit to the country, and the other—something very different. The Goldsmiths have abandoned their former practice of giving liberal prizes for mere paper plate, and now restrict their benefactions to art-workmanship. If they would supplement their good action in that by assisting to abolish a tax the proceeds of which would then be largely diverted into the pockets of the men whose skill they are doing so much to foster and encourage, they would be more consistent, and would awaken the gratitude of those who find that at present the art most likely to find patronage in the silver trade is that which will cover the greatest amount of space at the smallest amount of cost.

"As for the workmen themselves, one wonders whether they know that they are the only body who are at present free from unlimited foreign competition. Their conduct in London last year is difficult to understand, first favouring, then condemning, the move for abolishing the duty. Those who led them on in their final move may be clear-sighted enough in their ware-rooms and counting-houses, but they are not good guides where the principles that lead to a nation's prosperity are in question. Let us hope the workmen will look deeper into the question this year. The facts alluded to in this paper, and they are related with a full knowledge of the subject, are well worth pondering over. They are the deliberate convictions of one who, more than forty years ago, was the only convert of the doctrines of Free Trade in a whole shopful of workmen, and who has been an ever-willing witness of the great changes for the better England has experienced since those doctrines began to be acted upon. The silver trade has been left as an almost solitary exception to the application of those principles, and the results are self-evident to many."

Securing the Pendulum of Clocks.

Patented by John Ganter, Rosoman Street, Clerkenwell.

This invention relates to clocks which are enclosed in a wooden or other case intended to be suspended on a wall or in any other suitable position, and the pendulum of which is accessible through a small door in the under side or in the face of the case, and the object is to provide simple means whereby the pendulum may be securely fixed within the case so as to prevent it moving about when the clock is being transported from place to place, thus obviating the necessity of detaching and removing the pendulum from the clock.

The pendulum is essentially of ordinary construction, but the nut working on the screw formed on the end of the rod, and whereby the pendulum "bob" or weight can be adjusted on the rod so as to regulate the clock, is recessed in the middle, so as to form an annular groove with a projecting flange on either side. These flanges are milled, roughened or formed with teeth on their periphery, to facilitate turning the regulating-nut in either direction when necessary to raise or lower the "bob" or weight.

One end of a flat spring is secured to the pendulum "bob" or weight and its outer or free end bears on the upper flange of the regulating-nut above mentioned, entering the spaces between the teeth, roughened or milled surfaces on its periphery, for the purpose of preventing the nut from being turned unintentionally, either through any jarring motion or while being secured in the case as hereinafter described.

The means for securing the pendulum consist of a metallic piece or plate projecting outwards at right angles to the back of the case, to which the ends are secured by screws or other suitable means in a position almost directly in line with the regulating-nut on the pendulum rod. The holes through which the screws pass to secure the plate may be elongated so as to form vortical slots to allow of the plate being adjusted vertically to the exact position desired. A recess is formed in the plate just large enough to receive the metal remaining between the flanges of the regulating-nut, and the thickness of the plate is such as to fill up the annular groove therein, so that the flanges fit over the top and bottom of the plate.

A sliding bolt is fitted to move in guides formed in the plate, so as to be capable of being brought over the recess therein, and thus secure or lock the regulating-nut.

Instead of making the plate wide enough to fill the annular groove in the regulating nut, it might be made narrower, and the sliding bolt arranged to fill up the remainder of such groove.

The construction of the sliding bolt may be varied, but a convenient mode of forming the same consists of an angle piece, having a part projecting from the outer arm (which fits over or slides on the outer edge of the plate) so as to cover the recess in the plate when the bolt is shot; while the other arm of the angle piece works or slides on the top of the plate. A longitudinal slot is formed through the plate, and a screw or stud passes through the slot and is secured to the top arm of the angle piece, a spring plate or washer being inserted between the head of the screw or stud and the under side of the plate, so as to prevent the bolt shifting from the position in which it is placed.

The flat spring bearing on the top flange of the regulating-nut will prevent the latter turning when the bolt is shifted, so as to bring it between the flanges of the nut, or to remove it therefrom.

When the "bob" or weight has been adjusted to its proper position on the pendulum rod, the plate may be secured to the case so as to be directly behind the annular groove between the flanges of the regulating nut, but it is preferable to place it in a slightly higher position, so that the pendulum must be lifted somewhat to bring the groove in the regulating nut opposite the plate, the extent of the lifting being such that the pendulum rod will not be disconnected from the clock movement. By thus slightly raising the pendulum, its weight (including the "bob") will be supported by the metallic piece or plate.

◆

Electro-Plating with Nickel.

By William H. Wahl.

[A paper read before the Chemical Section of the Franklin Institute, and published in the Journal of the Institute.]

IN the same year (1843), Dr. R. Bœttger* published an interesting account of his experiments in plating with nickel, from which I take the following quotations: "No salt of nickel or of platinum has yet been found well adapted to plating baser metals with nickel or platinum. Experience has taught that a compound of cyanide of nickel with cyanide of potassium, according to the statement of Ruoltz, by no means attains the object, nor is the platinum salt recommended by him any better."

"From a long series of experiments expressly made on this point, I believe I have discovered, and can give the assurance that among all the salts of nickel none is so well adapted to plating, especially on copper or brass, as the ammonio-sulphate of nickel; at least, the cyanide of nickel and potassium recommended by Ruoltz is far inferior to it, even in a very long-continued, constant current. Sheet copper comes out of the solution of ammonio sulphate of nickel almost *silver-white* and *brilliant*. I have obtained in this manner, after the action of a moderately strong galvanic current for half an hour, a considerable deposit of nickel on copper, quite sufficient to deflect violently from the magnetic meridian, a magnetic needle suspended by a fibre of silk. A drop of common nitric acid on the nickel coating exhibited in a given time no sensible action on the subjacent metal, while sheet copper which had been allowed to remain in a gilding bath under the influence of the current for the same length of time, was almost instantly attacked by nitric acid. From this it may be inferred that the galvanically deposited nickel coats the copper more rapidly, adherently, and uniformly than gold similarly deposited." . . .

"To prepare the salt of nickel here referred to, the impure nickel of commerce suffices completely. To this end, it is dissolved in nitric acid, a stream of sulphuretted-hydrogen is passed through the solution for some time in order to precipitate all copper and arsenic, and the filtered solution is then precipitated by carbonate of soda. The well-washed carbonate of nickel is dissolved in dilute sulphuric acid, and the solution is placed beneath a bell-glass over concentrated sulphuric acid, in order to obtain it crystallized. These crystals are pulverized, transferred to a suitable flask, and ammonia gradually poured over them, until sufficient has been added to dissolve them. The resulting fine, dark-blue solution, may be directly used for the purposes above named."

It may be proper to add, in this connection, than one of the uses suggested by Bœttger for his solution is for the preparation of pure sheet nickel.

In the fourth edition of his work Roseleur† affirms that as early as the year 1849 he had succeeded in the establishment of M. Kraintz, at Grenelle, in obtaining on table ware an excellent deposit of nickel of considerable thickness, with the use of the double sulphite of nickel and ammonium as the depositing solution.

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* "*Jour. f. prakt., Chem.* xxx, p. 267, *et seq.*

† "Manipulations Hydroplastiques," etc.; *par* Alfred Roseleur. Paris, 1880, p. 301.

The next important contribution to the art of depositing nickel by galvanic means is made by Mr. George Gore, who, in 1855, employed the double salts of nickel and ammonium, *i.e.*, the double chloride. In the edition of his work on "Electro-Metallurgy," published in 1860 (Griffin & Co., London, 1860), he describes a method for the electro-deposition of nickel by means of a solution of the double chloride of nickel and ammonium.

In 1862, MM. Becquerel, *père et fils*, read before the French Academy a paper on the "Electro-Chemical Reduction of Nickel, etc.,"[*] from which I quote as follows: "Nickel, we operate with a solution of sulphate of nickel to which has been added caustic potassa, soda, or ammonia, preferably the latter alkali, to saturate the excess of acid. Sulphuric acid becoming free is saturated by oxide of nickel placed on the bottom of the vessel, or by adding alkali to the solution, ammonia by preference. At the end of a certain time we obtain a brilliant, white deposit with a slightly yellow tint. According to the moulds employed it may be obtained in cylinders, bars, or medals. They possess, like cobalt, magnetic polarity when taken out of the solution. The ammonical solution of the double sulphate of nickel and ammonium, and even that which is not ammoniacal, likewise furnish metallic nickel."

In 1869, Isaac Adams, Jr.,[†] of Boston, obtained a patent in the United States for an "Improvement in the Electro-Deposition of Nickel," in which he describes a method of preparing the double salts of nickel—the double sulphate of nickel and ammonium, and the double chloride of nickel and ammonium—by which the same are obtained free from certain impurities, to the presence of which, he claimed, the difficulties in the way of obtaining a satisfactory deposit of this metal by galvanic means were ascribable. He describes in his patent specification a method of preparing these two compounds in such a manner as to be free from the presence of potash, soda, lime, alumina, and nitric acid, and directs that the electro-deposition of nickel by means of either of these double salts must be done from a solution that is free from acid or alkaline reaction. He likewise claims as his invention a method of preparing the nickel plates to be used as anodes in the depositing cells, which consists in melting the nickel and combining it with iron, for the purpose of avoiding the bad effects produced by copper and arsenic when these are present as impurities in commercial nickel. The effect of the addition of iron to the nickel (the amount being the chemical equivalent of the copper and arsenic present), Mr, Adams affirms, is to prevent the deposition of the above-named impurities with the nickel. Quoting from the specification, "the iron itself is almost wholly precipitated as a peroxide, and is not deposited with the nickel to a sufficient extent to injure the character of the deposit. Neither does it injuriously affect the solution. The effect of the iron upon the copper is either to prevent it from being dissolved, or, if dissolved, to immediately reduce it upon the anode, where it forms a coating which may be reduced from time to time by scraping. The arsenic forms an insoluble precipitate with the persalt of iron."

Mr. Adams continues:

"Having prepared the solutions and anodes, as herein described, nickel may be readily deposited; but, in order to carry on the deposition continuously, it is necessary to observe certain precautions: First, the use of a battery of too high an intensity must be avoided. An intensity of two Smee cells is sufficient. A high intensity decomposes the solution and liberates free ammonia, thus rendering the solution alkaline, and impairing its value. Whenever the smell of free ammonia arises from the decomposing cell the operator may be certain that the solution is being injured. It is important that the depositing shall not be forced by the use of too strong a current. Second, it is important that great precaution should be used to prevent the introduction into the solution of even minute quantities of potash, soda, or nitric acid.

(*To be continued.*)

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[*] "Reduction electrochimique du cobalt, du nickel, de l'or de l'argent et du platine;" par MM. Becquerel et Ed. Becquerel.—*Comptes Rendus*, lv. p. 19, *et seq.*

[†] Consult U. S. Pat., No. 93,157, August 3, 1869; or British Pat. No. 31,251, October 28, 1869.

Goldsmiths' Hall, London.

TECHNICAL EDUCATION.

1884.—Thirteenth Competition.

(*Concluded from page 152.*)

An indication must be given on each drawing, showing which parts are to be hammered, which chased, and which cast and chased.

Originality shall be necessary to obtain either of the prizes for design.

The prizes will be awarded in the month of December next, and objects of art and workmanship must be sent by the competitors to Goldsmiths' Hall, addressed to the care of the Clerk, in the week ending the 22nd of November, between the hours of eleven o'clock a.m. and four o'clock p.m.

Each object shall have a word or motto (not a device) attached to it, a counterpart of such word or motto being put on the outside of a sealed envelope, addressed to the clerk, and containing within it the name and address of the competitor, which envelope will not be opened until the prizes shall have been awarded, and any object shall be excluded from a prize if any indication be given of the competitor.

Competitors for two or more prizes must put the same word or motto upon every design and object sent in for competition, and they must state distinctly in each case for what prize they are competing.

The objects sent in competition for prizes shall be left until the 1st of March for exhibition by the Goldsmiths' Company, if the Company shall think proper to cause them to be exhibited.

Competitors may, if they please, mention a price for which they are willing to sell the design or object exhibited, and the copyright therein.

The Company reserve to themselves the right to withhold the prizes for the several objects before mentioned, or either of them, if they shall be of opinion that no object of sufficient merit shall have been submitted to them.

The Company have also resolved that a travelling scholarship of £100 may be awarded by the Wardens to a Student who has shown exceptional talent, and who shall have obtained prizes for design or modelling in three years' competitions, in order to enable him to study art in the precious metals on the Continent of Europe.

WALTER S. PRIDEAUX,
Clerk of the Goldsmiths' Company.

Goldsmiths' Hall,
January, 1884.

GOLDSMITHS' HALL, LONDON.

TECHNICAL EDUCATION.

1884.—THIRTEENTH COMPETITION.

WITH a view to the encouragement of Technical Education in the Design and Execution of Works in the Precious Metals, the Goldsmiths' Company of London have settled the following programme of Prizes for the current year:—

£70.—A prize of £70 for the best Model in plaster, or other suitable material, finished ready for casting, of a group, "Huntsman mounted on horseback with two hounds," the extreme height of the man not to exceed 14 inches.

£35.—A prize of £35 for the second best model.

£20.—A prize of £20 for tho third best model.

£30.—A prize of £30 for the best practical design for a Toilet Service, to consist of four pieces, namely: Mirror Frame, Casket with hinged cover, Hand Mirror, and a Trinket Tray. Each design must comprise all the above pieces, which will be judged collectively.

£20.—A prize of £20 for the second best design.

£10.—A prize of £10 for the third best design.

£30.—A prize of £30 for the best specimen, executed in Repoussé work in silver, of Cupid and Psyche, a photograph of which may be procured by intending competitors at Goldsmiths' Hall. The size of the plate to be 9 inches by 6 inches; a margin of $\frac{3}{4}$-inch to be left at the top and bottom, and a margin of $\frac{1}{2}$-inch to be left at each end of the plate.

£20.—A prize of £20 for the second best specimen.

£10.—A prize of £10 for the third best specimen.

£20.—A prize of £20 for a manufactured Beaker, or upright Drinking Cup, in silver, widening at the mouth, without either spout or handle, not less than 12 inches in height, ornamented with strap work, masks, raised belts, flutes, foliage, fruit, figure, or any description of chased work.

£10.—A prize of £10 for the second best specimen.

£5.—A prize of £5 for the third best specimen.

£15.—A prize of £15 for a Basin, Vase, or Bowl, for sugar, in silver, with or without handles, cover or glass lining.

£10.—A prize of £10 for the second best specimen.

£5.—A prize of £5 for the third best specimen.

£10.—A prize of £10 for a silver Breakfast or Luncheon Frame, to hold three or four bottles.

£5.—A prize of £5 for the second best specimen.

£30.—A prize of £30 for a cover of a Blotting Book, executed in Repoussé work in silver or silver gilt, pierced or unpierced, mounted or unmounted, in size not less than 12 inches in length by 9 inches in width.

£10.—A prize of £10 for the second best specimen.

£5.—A prize of £5 for the third best specimen.

£15.—A prize of £15 for the lightest and soundest specimen of Core Casting in silver (the jets to be cut off, and the seams from the mould to be left absolutely untouched), combined with fineness of the seams, of a figure of Venus, a copy of which may be procured by intending competitors at Goldsmiths' Hall, upon payment of the sum of 5s., which sum will be returned to every actual competitor, not being the winner of a prize, at the close of the competition.

£10.—A prize of £10 for the second best specimen.

£15.—A prize of £15 for the best Casting (subject to the same conditions) of the figure of an Ox by Mêne, a copy of which may be similarly procured at Goldsmiths' Hall upon payment of the sum of 5s.

£10.—A prize of £10 for the second best specimen.

£15.—A prize of £15 for an Ornamental Silver Box of any form, to weigh not less than 15 ounces, executed in Repoussé work, engraving, or any other work.

£10.—A prize of £10 for the second best specimen.

£5.—A prize of £5 for the third best specimen.

£20.—A prize of £20 for the best specimen of Ornamental Engraving on a silver plate, silver box, or silver waiter, round or square, of not less than 8 inches or more than 12 inches in diameter.

£10.—A prize of £10 for the second best specimen.

£5.—A prize of £5 for the third best specimen.

£20.—A prize of £20 for the best specimen of Heraldic Engraving of the armorial insignia of H.R.H. the Prince of Wales, worked to fill a circle of not less than 7 inches in diameter, on a silver plate, silver box, or silver waiter.

£10.—A prize of £10 for the second best specimen.

£5.—A prize of £5 for the third best specimen.

£3.—A prize of £3 for the best specimen practice plate of Heraldic Engraving, showing good progress and cutting, by an apprentice of any age.

£2.—A prize of £2 for the second best specimen.

£3.—A prize of £3 for the best specimen practice plate of Ornamental Engraving, showing good progress and cutting, by an apprentice of any age.

£2.—A prize of £2 for the second best specimen.

The last four prizes are offered with a view to the encouragement of art taste and workmanship among apprentices, and in awarding these prizes the length of time served by the apprentices will be taken into consideration. Competitors must satisfy the Goldsmiths' Company that they are in actual service under *bonâ fide* indentures of apprenticeship, and must produce a certificate of good character from their masters. A copper practice plate may be procured by intending competitors at Goldsmiths' Hall upon payment of the sum of 2s., which sum will be returned to every actual competitor at the close of the competition.

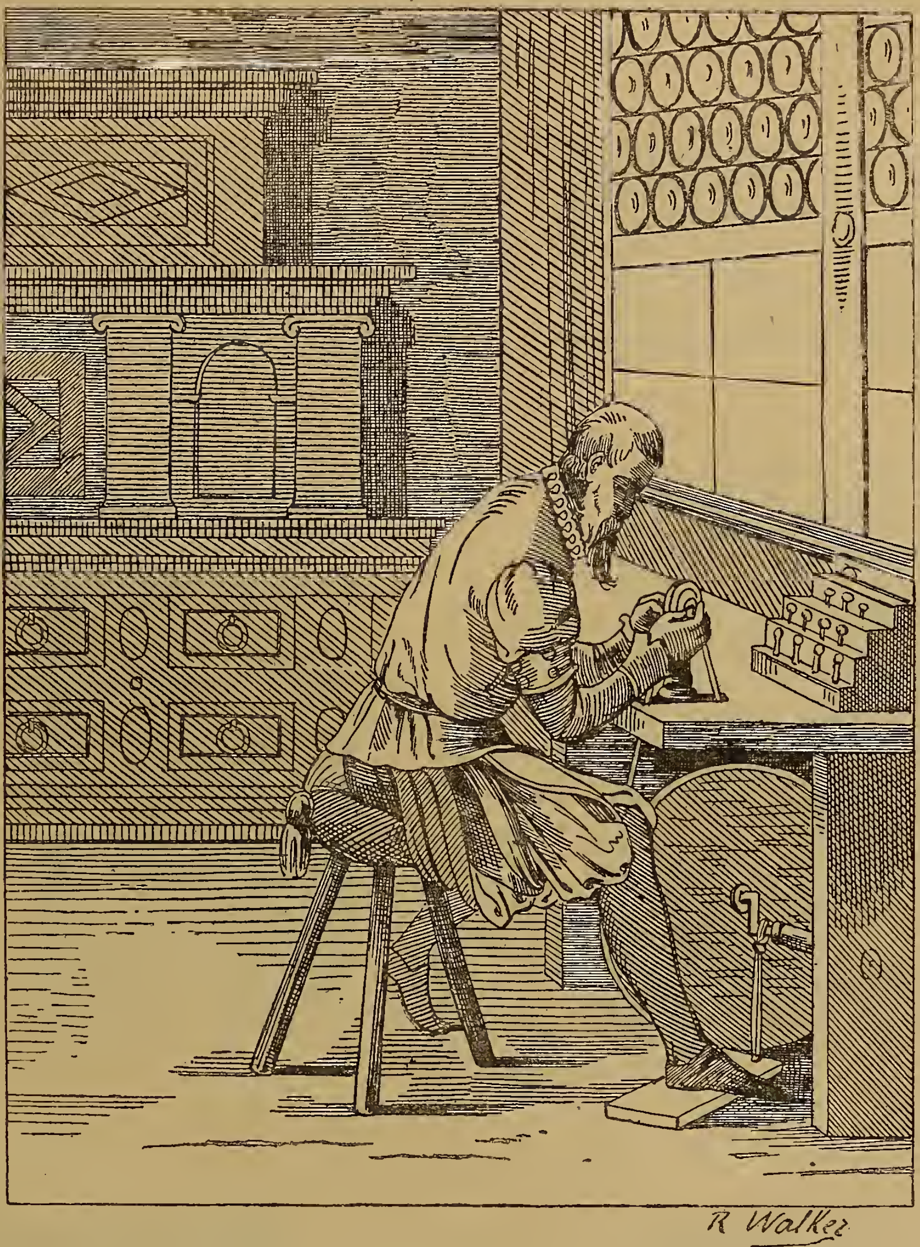
The cost of the manufactured articles is not intended to include the expense of designs of models, patterns or dies.

Everything offered for competition must have been made within the present year, and by a British subject, and the prizes will only be given to the actual executants.

All designs must be drawn, and all models made, to exact size.

Any partial gilding must be shown on each design or model.

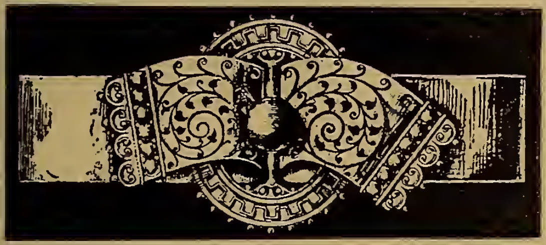
(*Continued on previous page.*)

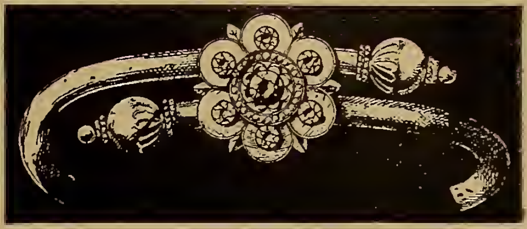


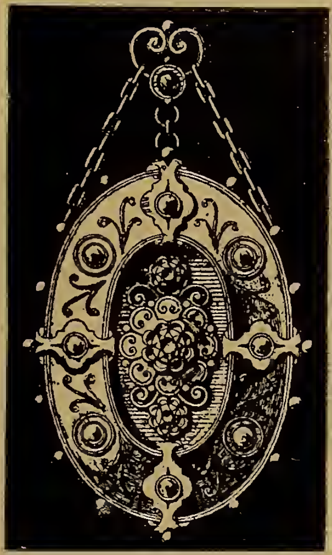
JEWELLER'S WORKSHOP OF THE FIFTEENTH CENTURY.

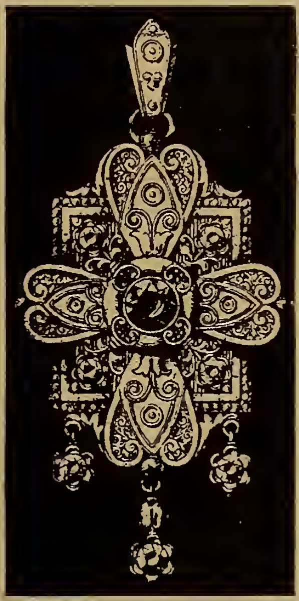
From a Wood Engraving by Jost Amman.

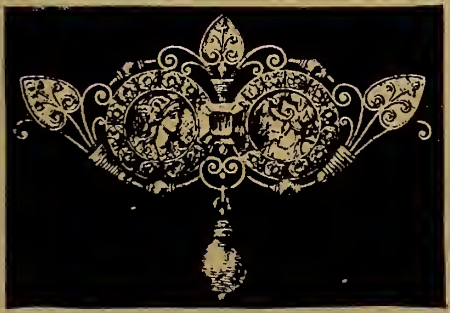
MONTHLY SUPPLEMENT OF DESIGNS.

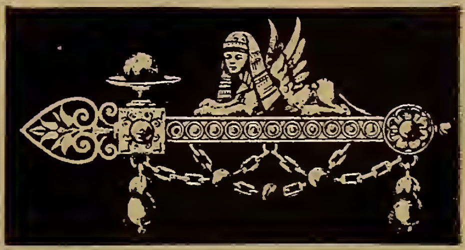












THE
WATCHMAKER
JEWELLER
AND SILVERSMITH

EDITED BY JAMES U. POOLE.

Entered at Stationers' Hall. Registered for Transmission Abroad.

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ILLUSTRATED SUPPLEMENT:—"Designs for Modern Jewellery."

The Worthies of Horology.

By C. Stuart Murray.

XX.

THE CLOCKMAKERS' COMPANY.

Seventh Part.

We left the company at our last interview, after having presented their petition to the House of Commons in 1814, praying strongly for protection against their powerful foe, the smuggler; and I myself gave some information as to the way in which boot-heels were made to get the contraband articles into London. The good-natured Sir William Curtis was one of the four Members of Parliament for the City. This is the gentleman famous in city annals for making his own grammar as he went along, and very amusing it always was. During the long Peninsular War, upon all festive occasions—and Sir William was supremely festive in his hospitality—his favourite toast ever was, "A *speedy* peace and *soon*." On account of his genial qualities, his great *natural* humour, and his thoroughly high, straightforward character, he became an "immense favourite" everywhere, and especially with George III. He was Lord Mayor in 1798, and, with only one short break, he represented the City from 1790 to 1826. The King made him a baronet in 1802, when he displayed the very appropriate motto upon his shield of *Gradatim Vincimus*, "We conquer by degrees." Sir William's friend and colleague, was Sir James Shaw, who was Lord Mayor of London, in 1805, and is known in the land of gold and good cheer under Bow bells for a banquet of unprecedented magnificence, at which he entertained George IV., then Prince of Wales, the royal brothers, and a long train of the nobility, at the Mansion House, in the beginning of his mayoralty. His motto, *I Mean Well*, might have equally answered for Sir William Curtis. The Company were piloted before Mr. Vansittart, the Chancellor of the Exchequer, by Sir James Shaw, Sir William having an understanding about subsequent action. The Minister was informed of the large seizure of smuggled watches that had been made at the town and country houses of a Mr. Poitevin, in December, 1815, a few days previously, and the great injury that smuggling was doing to the English watch trade. Mr. Vansittart expressed a desire to have some recommendations from the company to enable the Government to deal still further with the subject. These were embodied in a memorandum containing the heads of a proposed Bill to be brought into the House of Commons. As this memorandum is now a historical curiosity in its way, I need offer no apology for reproducing it here:—

1. No foreign clocks or watches to be imported at any other ports than those of London, Bristol, or Liverpool.

2. No foreign watches to be imported in parcels of less than fifty each, nor foreign clocks in packages of less than twelve each.

3. No clocks or watches to be imported in an incomplete state, nor without their cases, nor out of their cases; nor clock nor watch cases to be imported without their movements fixed in them.

4. All foreign watches or clocks having any name, or place of abode, or freedom, purporting to be the name, or place of abode, or freedom of any British watchmaker, engraven or painted on any part thereof, to be strictly prohibited.

5. All foreign clocks and watches to have a mark permanently imprinted on some part of the movement or cases, by the officers of the Customs, when the duties are paid.

6. All dealers in foreign clocks and watches to take out an annual license so to do, not less in amount than the plate license now necessary to be taken out by English watchmakers, and to write over their doors—"Dealer in foreign clocks and watches."

7. From and after —— day of —— next (twelve months after the passing of this Act), all foreign clocks and watches which are unmarked will be liable to seizure, unless the proprietors (such proprietors not being dealers) make affidavit that they were possessed of them previously to the passing of this Act.

8. All foreign clocks and watches seized under the provisions of this Act, to be sold for exportation only."

Following these propositions increased vigilance became the order of the day, and in the autumn of 1816 two considerable seizures of foreign clocks and watches were made—one at a Mr. Faton's in New Bond Street, and another at a Mr. Guillaume's, in Richmond Buildings, Dean Street, Soho. In 1823 it was proposed that all clocks and watches coming into the country should be bonded and marked. This was held to be inadmissible by the Board of Trade, but the bonding and refusal of entry to articles having any mark purporting to be of London make were adopted. Numerous watches and clocks were subsequently seized and dealt with in accordance with the new instructions of the Board of Trade; still that did not stop the importations, and the forging of the London Hall-mark was added. All such goods were confiscated from time to time, the forged marks punched out, and the articles sold in the usual way at the Custom House. "Hambro'" appeared to be the sinning place of exportation, and in 1827 an Act was passed containing a table of prohibitions and restrictions with penalties of confiscation. There were low-priced watches then as well as now, for some of those seized were valued, the silver ones at as little as 12s. each; and such vigilant care did the Company exercise that a great many movements were destroyed, and the cases battered up.

The principal cause of the smuggling was what was called the "countervailing duty" of 75 per cent. upon all imported watches and clocks, which duty was imposed by Mr. Pitt in his *ad valorem* commercial treaty with France, about 1787. We entered into what became known as "the Great War with France," in 1793, then came the short peace of Amiens in 1802, when the war broke out again, and continued until "crowning Waterloo" in 1815. This is mentioned to illustrate what seems a contradiction; namely, that whilst nearly all kinds of smuggling throve during the war, that of watches and clocks sensibly decreased. But when the General Peace came the illicit trade equally revived. As it would occupy too much space here to go into an explanation of such an unlooked-for phenomenon it will be left to the ingenuity of the student of political history.

In a few years afterwards we find that Geneva and Neufchâtel entered the field of competition, and passed large quantities of their produce through France. Furthermore, when English travelling was resumed on the Continent, it was "quite the thing" for the traveller to fit himself out in the watch way, and, without looking upon the dark side of the business as any sin, to smuggle as many home for his family and friends as he dared to risk. Indeed there are hundreds of people of middle age who can relate how their fathers went to Paris, or Geneva, and brought home watches unknown to the Custom House for "the whole lot of us." Nor was this to be wondered at when the difference of price, in the cheaper kinds of watches especially, is considered as compared with the home market. Exclusive of the value of the gold and silver for the cases the cost of manufacturing clocks and watches, but more particularly watches, depends upon the price of labour. The value of the raw material, the steel and brass, as compared with the finished instrument, is very small indeed. This value is estimated at from three to five shillings a movement. In this estimate of "raw material" is included the steel wire of which the pinions and pendulum springs are made. What the trade as it was then seriously complained of was, that the manufacturer abroad drew most of his materials from London, and having made the clocks and watches, got them into this country in the best way that he could, so as to sell them here a good deal under the Englisn maker's "quotation." All this is part of the history of the trade, with the whole of which we ought to make ourselves well acquainted. It is not generally known that, until the year 1825 the exportation of the same class of materials had been rigidly prohibited here. To satisfy themselves of the truth of the exportation of such materials, after the year 1825, the company employed a person at Locle, in the Canton of Neuchâtel, at that time the principal seat of the Swiss manufacturing trade, to purchase both pinion and pendulum-spring wire, as well as other articles in a partially prepared state, and was always told that they all came from England, and if he required any quantity, his best way would be to employ an agent to send direct to him at once. Even then machinery, such as it was, had begun to be "talked about" in horological manufacture, but it seems to have gone little further than preparing what has just now been spoken of.

We must not omit to mention here that the elegance and flatness of the Swiss watches had made an irresistible impression upon the English buyer, so much so as to compel notice to be taken of it. In a memorial which the company presented to the Lords Commissioners of the Treasury in 1832, that statement was questioned strongly. The superiority of the English watch of the day was admitted, in addition to which it was insisted on that English watches could be made, and were made, in London, "as small, as flat, as neat, and as beautiful to the eye as any made on the Continent; *but they cannot be made at the same cost*, and consequently cannot be sold at the same price." Any attempt in that direction by way of competing with the foreign artisan was put forth as producing a tendency to make a lower class of instrument, and so imperil the reputation of English work. In the great centres of watch industry in this country there were loud cries of distress. On account of want of employment, not only London, but Liverpool, Coventry, and Prescot were sending their wail into the public ear, accompanied by the prospect of overgrown poor-rates. And all this was put down to the smuggling of the English agents of the Swiss watchmaker, and to the Swiss manufacturers themselves! "The home wholesale smuggler carries on a most profitable agency with very little *pecuniary* risk, and without any personal risk whatever." There was another general complaint which the reader will presently recognise as suggestive of the maxim of history repeating itself. That complaint was, that foreign watches were smuggled into London, particularly repeaters, without cases, when they were put into cases made here and sold as English watches. Great numbers of them, after having been thus provided for, were exported as of English manufacture. Another curious phase of this practice was, that, notwithstanding the continuous advertisements and cautions that appeared in the daily newspapers, the business went on as if nothing was being said. Does the reader see any parallelism with our present time in that? The best remedy, if the customer could only have thought of it was, *Caveat emptor*, "Let the buyer beware."

It seems somewhat strange that, on account of a blunder in the wording of an Act of Parliament for the regulation of the Customs, that foreign watches which had been at the Custom House, having London names upon them, were obliged to be restored to the owner upon payment of the duty. There were some hundreds of them, and they could be either released and brought into the market in the way above named, or re-exported free of duty, it being believed at the time that the Act must doom them to confiscation. I gave in a bygone paper some striking instances of what I called "dead-letter law." Such law was not wanting fifty years ago any more than it is now, the "collective wisdom of the nation" being at that period nearly as capable of muddling as it is at the present day, although not quite so noisy and obstreperous. But still the law did not always stumble, for in the session of 1823, the following clause was introduced into what was called the "Warehousing Act," which clause was certainly sufficiently stringent for anything in the way of prevention. It is of great interest, and therefore, as a specimen of bygone legislation, I will give it *in extenso* here. There were a goodly number of clauses in the Act, for this is the 81st :—

"And be it further enacted, that no watch of foreign manufacture shall be imported and warehoused under the provisions of this Act, upon the cases or case of which any mark or stamp shall be impressed, which shall be similar to, or shall purport to be or shall be intended to represent, any mark or stamp of the Goldsmiths' Company of London, or other legal British assay marks or stamps; and that no clock or watch of foreign manufacture shall be so imported and warehoused, upon the face or upon any part of which the word 'London,' or the name of any other town or place of the United Kingdom, shall be engraven or painted, or shall in any way appear, so as to purport or give colour that such clock or watch is of the manufacture of the United Kingdom; and that no clock or watch of foreign manufacture shall be so imported and warehoused, unless a distinguishing number and the name or names of some persons or place shall be engraven and shall appear visible on the frame or other part of such clock or watch, independent of the face, purporting to be the name and place of abode of the person or persons by whom such clock or watch was made; and that no clock or watch of foreign manufacture shall be imported and warehoused under this Act in any incomplete state, that is to say, not having the movement, with all its concomitant parts, properly fixed and secured in the case, on pain of the forfeiture or such clock or watch."

The object of that clause is plain enough, and was so looked upon by all whom it concerned. Let us now see how it developed itself in action. About the following September, the Act having passed in May, a large parcel consisting of gold, silver, and metal watches was imported from Hambro' to the number of 846, and these were followed by a second parcel of 450. They were all seized at the Custom House for not being in accordance with the clause just recited. This being the first seizure under it, the authorities of the Treasury confiscated them. Some of the gold and silver ones were sent to Goldsmiths' Hall, where they were soon found to be neither gold nor silver, with several exceptions. The base ones were ordered to be destroyed without mercy, and destroyed they were, whilst those that passed the assay were ordered to be restored to their owners upon payment of certain expenses, and giving a bond under penalty that they should be returned to the port of exportation. There was no further attempt at that time to ride "rough-shod," as it were over the destructive clause, but important events in the chain followed, nevertheless, quite as interesting, which I shall detail in the next paper.

The Silver Duty.

THE following letter appeared in the *Sheffield and Rotherham Independent* on the 10th ult. We reproduce it, because we do not wish to shelter ourselves from adverse criticism; but our readers will, no doubt, re-peruse the article in the last issue and judge for themselves if the quotations are fairly made. Certain personal statements in the letter are made on the writer's responsibility, who is evidently labouring under a misapprehension, as is also another critic in a trade contemporary.

The whole gist of the question is connected with the claim for drawback. Mr. Gladstone and Mr. Childers have both said that they cannot pay it, therefore large holders of stocks prefer to be let alone, sooner than face the depreciation in their value. They do not appear to derive much encouragement from the glowing prospects of the future prosperity of an unfettered trade as depicted by the leaders and supporters of the agitation for freedom, but it is not at all improbable that the said statements may seriously influence the Chancellor of the Exchequer, and lead him to think that increased business should be set off against a present loss. Our own opinion is that the British industry would not benefit in the least, any more than the watch trade has done, but whether silversmiths have a right to be peculiar in going on under conditions of protection is another matter altogether.

Some large manufacturers say, however, that they desire the continuance of the compulsory hall-marking system, in order to ensure a common basis on which the trade shall be conducted, and that they do not fear the competition of goods equal in quality to their own.

THE SILVER DUTY.

To the Editor of the "Sheffield and Rotherham Independent."

"It is interesting to meet, after a long interval, people who retain unaltered the opinions widely held in an earlier part of our career, but which have since then been generally discarded. For instance, the present editor of the *Watchmaker, Jeweller, and Silversmith* recalls to the writer, by his manner of arguing on the question of the silver duty to-day, opinions he had to hear expressed forty years ago on the then talked of abolition of the import duty on gold, jewellery, and trinkets. The said editor is a fair representative of a large class who reason mostly through their fears. Hearken to his words, 'There is no doubt but the trade cling to the duty, on account of the security which the compulsory Hall-marking system affords them against foreign competition; they regard it in the same light as Wellington did Hougoumont at Waterloo.' And he assures us, with evident complacency, that a certain regulation, recently enacted, 'makes the trade more than ever a protected one.' This has, at least, the merit of perfect candour, and coming from Mr. Poole, who is understood to have been for a length of time a privileged exponent of the views which predominate at Goldsmiths' Hall, it may be fairly assumed to express the views at present held by that influential body. The chief bugbear conjured up by the imagination of Mr. Poole and those who think with him is the deluge of Indian plate which is to be poured in upon us to the swamping of our home silversmiths. Having sufficiently frightened themselves by a look eastward, they next turn their eyes on the west, and as cheap labour is notoriously no feature in American production, they find a bogey equally alarming in cheap silver, for it is difficult to imagine any other meaning which could be attached to the editorial remark, that 'a few years ago Mr. Watherston was highly extolling the beauty of American silver plate, and it is only reasonable to suppose that American manufacturers, backed up by such mines as the 'Nevada,' would secure an important place in the market, as a special exception could not be made in favour of our fellow-subjects.' Reasoning of this kind was rife enough in Sir Robert Peel's days; Free Trade was to most of us then a leap in the dark, but the road is luminous enough now.

"It is not long since Bradford was loudly invoking aid from the Government Jupiter, but only met the old response; so with shoulder to the wheel they got out of the rut, and are now once more moving steadily onwards. Knowledge and enterprise directing capital, talent, and conduct joined to handicraft are safer to depend on than protective enactments, which give promises they cannot insure, and mislead men into the evil habit of leaning on props which prove but rotten when the strain comes. With all the world to select our raw materials from under the most favourable conditions, we must study how to work them up to the greatest advantage, bestowing on them the utmost value by our skill in manufacture and decoration. Since the advent of Free Trade many of our drooping industries have, one by one, revived, and shown a vigour of growth greater than ever before experienced; this has been conspicuously so in gold and silver jewellery, on which no duty is levied, while silver plate is, as we should expect from its conditions of manufacture, an invalid and a cripple, much cared for by economic quacks. One of the first fabrics to revive was that of high-class pottery. Worcester led the way, and the china works in that town are among the most profitable enterprises in England at the present day.* Derby is now following suit, with full promise of a like success; and the number of smaller concerns, which generally devote themselves to some speciality, especially in the neighbourhood of London, is daily on the increase. Assuredly, if any trade could be justified in fearing Eastern competition before experience had enlightened us, it should have been that of the potter. The countries in which the porcelain manufacture was long a close secret from Europeans had still many advantages on their side, accumulated experience, abundant material at hand, and cheap labour; yet, with all these, they have not yet desolated our English potteries.

"The Government have now entered upon a hopeless endeavour to reconcile the irreconcilables of the trade with the aggrieved East Indian interest. Among other projects they propose allowing a class of goods 'of a peculiar character as regards workmanship, and highly ornamental, to be sold freely upon payment of the Customs duty.' They think 'there is reason to believe that this proposal would not be resisted by the home trade.' 'My lords,' says the Secretary to the Treasury, 'will consult their legal adviser, with a view to the preparation of a Bill to this effect; but the Secretary of the State (for India) will of course understand that any such concession could not be confined to India.' Like any other bungling workmen, the Government have been engaged in stopping up one source of leakage, and breaking open another. Last year they enforced the law that all plate of Indian or foreign origin entered at the Custom House should be forwarded to Goldsmiths' Hall for assay and hall-marking; this year they propose that certain articles of silver sent from India through the Parcels Post shall be admitted without being subjected to the above processes, and that a declaration by the agent of the Peninsular and Oriental Company should be a sufficient guarantee that they are intended for private use, and not for public sale. This small concession may yet be carried further. The secretary says: 'If some proper definition of them could be agreed upon, legislative powers might be sought to exclude them from the obligation of being assayed, and they could thus be imported and sold freely upon payment of the Customs duty; and, of course, any such concession could not be confined to India.' Through this little crevice what deluge from India and Nevada may not ultimately find its way, in drowning our already feeble and timid home manufacture! The fears of our Pooles and their prompters will surely be aroused afresh at the prospect. For, once concede the principle that elaborate workmanship may condone the quality of the metal, it is impossible to foresee what the ingenuity of interested parties may bring about; the only safeguard will be by reforming it altogether. Agitation at home, backed by the East Indian interest, will never cease till the silver trade is planted on firm ground like any other. Let the trade take heart of grace, and submit at once to that which is inevitable sooner or later. 'Better a finger off than aye wagging.'

"That a Government ostentatiously Liberal, and the members of which are looked upon as uncompromising free traders, should condescend to patch and repair a worn-out system of supervision and practical hindrance, at the instigation of a body notoriously Conservative in its instincts, as the Goldsmiths' Company assuredly are, is one of those unexpected turns which make men wonder whether consistency is in those days held to have a virtuous ingredient in its composition. The Government affect great solicitude for the well-being of the working-man, yet persist in seeing only the relief which would be given to rich purchasers of silver plate by the abolition of the duty, shutting their eyes to the relief that would be afforded to the actual workers in silver by the natural increase in the demand for plate. True, the workmen themselves do not all see it in that light; but the members of the Government are well up in the history of our free trade development, and their knowledge of what has been done in the past affords safe grounds for forecasting the results of an act of justice, recommended to them as desirable by a Committee of the House of Commons, which gave a full hearing to evidence from every quarter, and decided with but one dissentient, and that dissentient an Onslow, that the silver duty should be abolished. The Goldsmiths' Hall influence, which could not in an open investigation make out a satisfactory case for the retention of the duty, is now the favoured counsel with our Chancellor of the Exchequer, and practically directs the legislation by which a once flourishing manufacture is kept down at its present low level, a useful warning to those who would invoke Government to undertake functions which private enterprise can regulate far better.

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* [The following appeared in a leading article in the *Daily Telegraph* on the 15th ult., and was quoted by us, in a reply to "An Old Hand," published in the *Sheffield Independent*—Ed.]

"North Staffordshire, on the other hand, sends a report the tone of which is one of unrelieved gloom. The china and earthenware trades, we are told, have not been so depressed for several years as they are now. 'Every market is dull, and short time is the rule throughout the district.' Not only are there no orders from America, but manufacturers will now have to face the competition of the United States as well as of Continental china, the imports or which are largely increasing. This news will be a shock to many Englishmen who have, particularly of late years, believed that the great pottery kings of the district, the Wedgwoods, Mintons, Copelands, had brought their productions to a pitch of excellence and artistic refinement that would defy competition. It is, moreover, especially unwelcome to be told that the Americans, whose struggling earthenware industry it was found necessary to foster by an increased tariff only last year, have already gone so fast ahead as to threaten Hanley and Stoke in their own domains." Of Sheffield it says:—"Sheffield announces the steel trade to be 'singularly dull;' the exports show a falling off all round; the coal miners are not employed one-half the week, and in some districts there is considerable suffering thorough lack of work; iron is also very languid; and, although the lighter industries are fairly active, 'complaint is heard on every side of the increasing keenness of competition and the difficulty of retaining our hold on foreign markets.'"

"An Old Hand."

This subsequently appeared in the *Independent*, on the 22nd ult.:—

"THE SILVER DUTIES.

"To the Editor,—Mr. Poole edits the 'Watchmaker, &c.,' a periodical that before his coming on was noted for its strong views adverse to the silver duty and hall-marking laws. Though himself a convert to Protection from having read the evidence taken before the Parliamentary Committee,* he admits to his pages the writings of those who differ most widely from him. This is, at least, fair play, and will be duly appreciated. He does not like my recent remarks on an article from his pen; but his own letter may be appealed to as evincing the truth of the observation that he is one of those who reason through their fears. All who look about them know, even if they do not experience the fact, that we have now passed from a period of business activity to one of comparative dulness, and there has not yet been found out any system by which the demand for work shall at all times be made equal; we have ups and downs, as we have always had, and it is misleading to make comparison between what is done in any one year with that which is done in the year preceding or following it. We must take a longer interval to measure our progress by. If we take a period of ten years and find at the end there are fewer of the ordinary signs of prosperity existing in a trade than at the beginning, we may conclude it is a falling trade. Apply this test first to pottery, then to the trade in hall-marked silver, and my contention will be fully borne out. Healthy business rises and falls like the tide; it does not dry up like a stagnant pool.

"Alarmists articles like that quoted from by Mr. Poole will again be rife; we will once more be told of the foreigner who is to supersede us both at home and abroad, and the clamour for Fair Trade and other equally wise cures for our business ailments will again be heard throughout the land. But there are other remedies now creeping gradually into favour. Bradford with its Technical Institute, with some 800 students seeking instruction, is a more hopeful sign than the same place calling out for the Government to protect them from those clever Frenchmen. Before long, Sheffield also will be seeing its way to supporting an institute for the training of capable men, who will carry forward the world-wide fame of the good town another stage, and leave it greater and more prosperous than they find it.

"And the watch trade; let them find out how they are being left behind in the contest by the skill and enterprise of the Swiss and Americans in devising and using machinery in their business, and not waste any more precious time in the effort to reconcile their narrow hall-marking regulations with the needs of modern trade and commerce.

"An Old Hand."

French Control of the Gold and Silver Trades.

A FRENCH law, authorising the use of a lower standard than has hitherto been allowed, for gold and silver goods intended for exportation, has just been promulgated. We give the sense of the more important clauses, which show the severe system of *espionage* which prevails in France, recalling the enactments of Edward I., under which the wardens of the Goldsmiths' Company were empowered to "go from shop to shop among the goldsmiths to assay if their gold be of the requisite touch, and if they find any other the gold shall be forfeit to the king," etc., etc.

It may perhaps be interesting to remind our readers that the lower standards of gold, viz., 15, 12, and 9 carats, were authorised here by an order of Council in 1854, the Goldsmiths' Company advising against their introduction, as stated in the Parliamentary Report published in 1879.

The new French regulations are as follows:—

Gold cases, exclusively for exportation, are allowed to be of a quality of 583 *millièmes*, or parts of a thousand. A special stamp will indicate the quality; and they will also be impressed with a mark, showing that they are to be exported, at the Bureau de la Garantie.

Silversmiths, jewellers, and casemakers using the higher qualities of gold and silver are not compelled to send goods intended for exportation to be officially marked; but they must use a special stamp themselves (*poinçon de maître*), the form of which will be determined by a further regulation, indicating the quality, which must be reproduced on their invoices.

All manufacturers, merchants, and commission agents wishing to avail themselves of the facilties afforded by the new law are required to make a declaration to the Prefecture of their department and the mayor of their commune. At Paris the declaration will be made to the Prefecture of Police and to the Bureau de la Garantie.

Mauufacturers and exporters are also to give every facility to the officials who from time to time inspect their operations, under regulations framed in 1816. They are to furnish, if required, the necessary balances and weights for making the tests.

Goods which under the new law are marked for exportation may not be sold in the country under any pretext whatever.

Those goods which shall be found on the premises of manufacturers, merchants, or commission agents who have not made the acquired declaration, or which are being used for home consumption, will be seized and confiscated, without prejudice to the enforcement of the following penalties:—

For the first offence a fine will be inflicted ten times the value of the goods; the second time it will be doubled, and bills posted at the expense of the offender, announcing the conviction. Should he be sufficiently daring or hardened to offend again, the fine will be quadrupled, and he will be absolutely interdicted from again engaging in the trade, under penalty of having all subsequent stock confiscated, irrespective of its character. In case of an imperfect inventory being rendered of stock on the premises, or goods sent out without being entered in the books, the fine will be 75 francs a hectogramme (3 oz. ·214) for articles in gold, and 4 francs for silver.

Gold and silver goods of the standards prescribed by the already existing laws, and intended either for exportation or internal consumption, will continue to be controlled by the same legislation. The present law, deliberated and adopted by the Senate and by the Chamber of Deputies, will be executed as a law of the State.

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* [We said that our opinions on the *Silver Trade* were formed by studying the above report.—Ed.]

Clock and Watch Makers' Asylum.

On Friday evening, the 18th ult, the Lord Mayor presided at a dinner at the Albion, Aldersgate-street, in aid of the funds of the Clock and Watch Makers' Asylum, New Southgate. His lordship was supported by Mr. Sheriff Cowan, Mr. Alderman Savory, Mr. Christopher Rowlands, the Rev. J. H. Rose (Vicar of Clerkenwell), the Rev. H. L. Nelthropp, and a large portion of the company consisted of influential members of the clock and watch trade from Clerkenwell, which, as is well known, is the seat of the industry in the metropolis and the country. After grace, the loyal toasts were proposed by the Lord Mayor, who made allusion to the Queen's acknowledgment of the national sympathy with the Royal Family in their recent bereavement. The usual patriotic toast was given by Mr. Alderman Savory, Colonel Chadwell Clarke offering response on behalf of the Military, Naval, and Volunteer services. The next toast, that of "The Clergy," was proposed by Mr. G. Scovell Adams, and replied to by the Rev. J. H. Rose.

The Lord Mayor, in proposing "The Prosperity and Perpetuity of the Clock and Watch Makers' Asylum," said he was much struck with the reflection how many of the different trades of this country had benevolent institutions connected with them—institutions either for the relief of the wants of the deserving aged, or making provision for the education of the children of members of the trade. He thought they must feel that such institutions deserved the support not only of the trade to which they were attached, but of the public in general. Especially was this so with a trade to which the public were so much indebted like the clock and watch makers. The benevolent institutions in connection with a trade were generally a school or an asylum or almshouse. The education of children was a great and good work, but as long as the parents lived it was a work to which they themselves would attend in these days of widespread education. There were members of the trade who, through ill-health or old age, had fallen into poor circumstances, and who deserved the support, in the first place, of their own trade and, in the next, of the public. In this institution the cause of need was more old age than ill-health, because he saw that the average age of the inmates of the asylum was seventy-four years and four months. It was right that the City Companies did support the cause of technical education and train up the young to make themselves thoroughly skilled workmen, able to compete with workmen of the Continent ; but at the same time they ought not to forget to show their generous sympathy with those who having through their lives devoted themselves to the trade, in old age, owing to no fault of their own, required assistance from others. (Hear.) The Clock and Watch Makers' Asylum was founded in the year 1853, to provide habitations, light, fuel, medical attendance, and pensions for aged and infirm members of the trade and their widows. The pension used to be £20, but had recently been raised to £24 a year. There were twenty-one houses at present, of which five had been added lately—one, he understood, by the Goldsmiths' Company, and one by the Clockmakers' Company, one by the workmen of the trade, and two by the private benevolence of individuals. There were twenty-one pensioners—eighteen married couples and three widows. The appeal on the present occasion was to defray the cost of alterations to the board-room and warden's apartments; it being necessary to enlarge the board-room to afford accommodation to the inmates for religious services and social meetings. It was also designed to erect three houses for widows, that the proportion of the male and female inmates might be maintained according to the rules, and further to increase the endowment fund. These were objects for which they were justified in making a special appeal. No married couple were admitted into the asylum unless the husband had been twenty-five years in trade, and no widow unless her late husband had been twenty years in the trade. This showed that the institution was thoroughly connected with the trade, and was a guarantee that those only were relieved who were deserving objects of sympathy and benevolence. As regarded the finances of the institution, the balance-sheet showed that the subscriptions received amounted to £304 and a legacy of £45, and donations amounting to £50 15s had been received. The Worshipful Companies of Goldsmiths and of Clockmakers, in answer to appeals made to them, had increased their annual grants—the former by £90 and the latter by £30. This had enabled the committee to give effect to the resolutions passed increasing the pensions of the males to £24 and the females to £15. He trusted that such contributions would be made, in answer to the appeal, as would enable the institution to increase the sphere of its usefulness in the augmentation of the pensions now granted to the inmates and addition to the number of the inmates. (Cheers.)

Mr. E. J. Thompson, in response to the toast, expressed regret at the absence of the treasurer (Mr. George Moore), to whom the institution owed so much for the active part he had taken in its welfare, and who, had he been present, would have replied to this toast. Tracing the history of the institution, Mr. Thompson pointed out that it took its origin at a meeting presided over by Lord Mayor Challis, more than thirty years ago, in support of one of their trade charities, when the idea was broached, that whereas there was a charity pertinent to employers of the trade, and another assigned to the working men of the trade, it would be a good thing if an institution were established where both parties could meet on neutral ground. Meetings were afterwards held in a small room in Clerkenwell, to give shape to the suggestion, and of the men who took the initiative in launching this institution only two remained—Mr. George Moore and himself. The heads of the trade of that time gave ready countenance to the scheme, which, owing to the efforts of Mr. George Moore, the Messrs. Rowlands and others, was successfully carried into operation. He was glad to say that the institution was free from debt. In conclusion, Mr. Thompson drew attention to the importance of the trade, and claimed that the invention of the chronometer and the application of isochronism to the pendulum spring was not less important than the adoption of the safety valve in the steam engine.

Mr. Saul Isaacs having proposed "The Chairman,"

The Lord Mayor, in response, promised that if the Corporation continued in its present form, his successors would, as had his predecessors, devote not a little of their time to the promotion of useful charities. The measure before Parliament, the object of which was to change a good many things connected with the City of London, did not nominally alter the position of Lord Mayor, though it took away five-sixths of his official duties. He did not say that under the new constitution, if it ever arrived, the Lord Mayor would not be ready to support good objects of a charitable kind, but there would be no obligation on him to do so. If some great man became Lord Mayor whose home was in Caithness or in Cornwall, and whose only connection with London was the occupation of a house in Belgrave-square, he did not think he would be ready to devote his leisure to these institutions as did the present race of Lord Mayors. (Cheers.)

Mr. C. Rowlands proposed "The Sheriffs," Mr. Cowan. replying ; Mr. Glasgow, "The City Guilds," the Rev. H. Nelthropp replying ; Mr. W. Parker, "The Visitors," Mr. Spice replying. The contributions announced amounted to £525.—*Daily Chronicle.*

Electro-Plating with Nickel.

By William H. Wahl.

[A paper read before the Chemical Section of the Franklin Institute, and published in the Journal of the Institute.]

(*Continued from page* 151.)

WHEN an article to be coated is cleaned in acid or alkaline water, or is introduced into it for any purpose, the greatest care must be taken to remove all traces of these substances before the article is introduced to the nickel solution, as the introduction of the most minute quantities of acids or alkalies will surely be injurious. It is important that the solution be kept free from all foreign substances, but its purity from those above named is especially important. Third, the anode of the depositing cell should present a surface to the action of the solution somewhat larger than the surface upon which the deposit is being made, particularly in the double sulphate solution. The reason is that nickel dissolves so slowly, that if the exposed surface is not larger than the surface on which the deposit is made, the solution will not keep saturated. On the other hand, if the anode is very much larger than the positive pole it tends to give a deposit of black powder. Fourth, if zinc is to be coated it should first be coated with copper, as it is difficult to make nickel adhere to zinc, and there is danger that the zinc may be acted on and injure the solution.

"With solutions and anodes thus prepared and used, the deposition of nickel can be carried on continuously and almost as surely and certainly as the deposition of copper from the common sulphate solution, though the limits of the battery-power which may be used are narrower. The metal deposited is compact, cohesive, and tenacious. It may be deposited of nearly uniform thickness over any surface, however large. The deposited metal is capable of being annealed by a heat below a low-red heat. It then becomes flexible, malleable, and ductile. The deposit may be made of any required thickness, either to furnish effectual protection to the metal on which it is deposited, or to be removed and used separately from the surface on which it may be deposited."

In the same year, but a few months earlier than the date of the patent above referred to, a patent had been granted to the same inventor for the use of a solution of the sulphite of nickel in a solution of sulphite or bisulphite of ammonium.* This solution is identical, apparently, with that which M. Roseleur claims† to have used as early as 1849, with excellent results, in the establishment of M. Kraintz at Grenelle, but which, as I glean from a *Notice supplémentaire sur le Nickelage*, which he has lately issued, he has discarded in favour of the double sulphate.

The Adams patents were the first on the subject of nickel-plating in the United States, and the rapid development of the art to the proportions of an important industry, which took place within a few years thereafter, gives colour to the claim that Mr. Adams is entitled to the credit of being the originator of the art of nickel-plating. I have elsewhere pointed out that the true explanation of the remarkable growth of this art is to be found in the substantial improvements in the metallurgical treatment of nickel, by which anodes of any desired size, and of great purity, were placed at the service of the nickel-plater; and more especially in the invention and improvement of the dynamo-electric machine, which has made the nickel-plater independent of the uncertain and troublesome voltaic battery. Had it not been for the want of these two important elements of success in this branch of the galvanoplastic art, plating with nickel would unquestionably have been extensively practised, years before it actually assumed a position as a successful and popular industry.

It cannot be denied, however that Mr. Adams, by directing the attention of technologists to the excellent qualities of tho double salts of nickel and ammonium at a time when everything was ripe for the new industry, materially assisted in calling it into existence, and in assuring its commercial success.

The years immediately succeeding 1869 were very prolific of inventions relating to the art of nickel-plating, many of which, however, were comparatively valueless. I select for notice few that appear to have meritorious features.

In 1877, John Unwin* of Sheffield (England) devised an ingenious process of preparing the double salts of nickel and ammonium. This consists in preparing a strong solution of sulphate of ammonium, by dissolving the salt in hot water in the proportion of about four pounds of the salt to each gallon of water, then filtering if necessary, and allowing the liquid to become cool. The double sulphate of nickel and ammonium is obtained by adding this solution to one of the sulphate of nickel. The novelty of Mr. Unwin's process, however, resides in the fact that he does not stop the addition of the sulphate of ammonium when sufficient has been added to combine with all the sulphate of nickel present, but continues to add it in large excess, "I do this," says Mr. Unwin, "because I have discovered that the double sulphate of nickel and ammonia is far less soluble in the solution of sulphate of ammonia, than in pure water, so that it is precipitated from its solution in water on adding sulphate of ammonia. I therefore continue adding the solution of sulphate of ammonia, continuously stirring, until the liquid loses nearly all its colour, by which time the double sulphate of nickel and ammonia will have been precipitated as a light-blue crystalline powder, which readily settles to the bottom of the vessel. I then pour off the liquid from the crystalline precipitate of double sulphate of nickel and ammonia, and wash the latter quickly with a strong, cold solution of sulphate of ammonia as often as I consider necessary for its sufficient purification." By this procedure it will be perceived, the double salt of nickel and ammonium is thrown down in a pulverulent, granular condition, readily soluble in water, and therefore ready for use in the depositing vat, without waiting for the tedious process of crystallization.

In 1878, Edward Weston,† of Newark, N. J., noticing its favourable influence upon the electro-deposition of nickel, secured a patent for "the electro-deposition of nickel by means of a solution of the salts of nickel containing boric acid, either in its free or combined state. The nickel salts may be either single or double." Mr. Weston affirms that the presence of boric acid prevents the deposit of sub-salts upon the articles in the bath, which is apt to occur if the bath is not in proper working condition; he claims furthermore, that its addition, in either the free or combined state, to a solution of nickel salts diminishes the liability to the evolution of hydrogen when the solution is used for the electro-deposition of nickel, and increases the rapidity of deposition, by permitting the use of a more intense current, and improves the character of the deposit by rendering it less brittle and increasing its adhesion,

(*To be continued.*)

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* Consult U. S. Pat., No. 90,332, May 25, 1869.
† See *ante*.

* Consult British Pat., No. 1548, April 20, 1877.
† Consult U.S. Pat., No. 211,071, December 17, 1878.

Queries and Replies.

WOULD you kindly inform me through your columns how to dissolve gold in acids, in large and small quantities, and speedily restore the same to the bright metallic state?

ACID.

◆

Australian Diamonds.

DIAMONDS are known to exist in considerable quantities in various parts of Australia.

In New South Wales their existence was discovered so far back as 1851, but little notice was taken of the fact. In 1867 numerous diamonds were found by gold-diggers in the Mudgee district, and in 1869 diamond-working was commenced in a systematic manner. The richest finds of diamonds have, however, been at Bingera, where during the last ten years many hundreds have been discovered—a circumstance which has led to a firm of diamond merchants commencing working operations on a more extended scale. The conditions under which the Bingera diamonds are obtained are much the same as at Mudgee, where the gems are procured from outliers of an old river drift which had in parts been protected from denudation by a capping of hard compact basalt. The drift is made up mostly of boulders and pebbles of quartz, jasper, agate, quartzite, flinty slate, silicified wood, slate, sandstone, and abundance of coarse sand mixed with more or less clay. Diamonds are also found in other parts of the colony. From the Borah Tin Mine, situated at the junction of Cope's Creek with the Gwydir, two hundred were obtained in a few months. Out of a batch of eighty-six, averaging one carat one grain each, the largest weighed 5·5 grains. Diamonds have been found on most of the alluvial tin workings at Cope's, Newstead, Vegetable and Middle Creeks, also in the Stanifer, Ruby, and the Britannia Tin Mines, and elsewhere. In colour the diamonds vary from colourless and transparent to various shades of straw-yellow, brown, light green and black. One of a rich dark green was found in the form of a flattened hemitrope octohedron. The most common crystalline forms which have been met with are the octohedron, the hemitrope octohedron, the rhombic dodecahedron, the triakis and hexakis octohedron, but they are all usually more or less rounded. The flattened triangular hemitrope crystals are very common. One specimen of the deltoidal dodecahedron was met with. The lustre is usually brilliant or adamantine, but occasionally they have a dull appearance. This want of lustre is not due to any coating of foreign matter, or to the same cause as the dulness of less hard and water-worn crystals, but it is due to the surface being covered with innumerable edges and angles belonging to the structure of the crystal. These reflect the light irregularly at all angles, and give the stone its frosted appearance.—*Pawnbrokers' Gazette.*

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Importation of Foreign Clocks and Watches.

WE quote the Board of Trade returns relating to the above, at the request of several correspondents; but as far as watches are concerned, it is well known that they cannot be depended upon. A very small percentage of the better class pass through the Custom House in a complete form; and the figures do not include the uncased movements imported by the American Watch Company, which are classed under the head of watch materials.

	QUANTITIES.						VALUE OF IMPORTS.					
	MONTH ended 31st MARCH.			THREE MONTHS ended 31st MARCH.			MONTH ended 31st MARCH.			THREE MONTHS ended 31st MARCH.		
	1882.	1883.	1884.	1882.	1883.	1884.	1882.	1883.	1884.	1882.	1883.	1884.
CLOCKS:							£	£	£	£	£	£
From France ... ... *Number*	5,491	7,130	6,143	16,285	17,532	16,689	16,641	19,084	19,772	51,586	49,629	53,475
" United States ... "	31,722	34,755	49,539	114,123	75,535	106,346	10,407	11,220	14,603	36,051	25,142	33,069
" Other Countries... "	30,397	49,577	23,066	105,701	126,913	72,013	9,698	14,650	7,265	32,339	39,360	23,063
TOTAL... ... "	67,610	91,462	78,748	236,109	219,980	195,048	36,746	44,954	41,640	119,976	114,131	109,607
WATCHES ... ... *Number*	36,187	39,586	40,867	92,361	103,909	112,380	43,924	48,285	47,138	111,049	126,846	135,408

Watch Rating at Kew Observatory.

THE arrangements for officially testing watches, and thus putting them on the same footing as other scientific instruments, have at length been completed, and we now publish as many of the conditions as our space will admit. They have been drawn up by the Kew Committee after consultation with the directors of the Geneva Observatory, and Yale College, U.S.A. The fees for the three classes are 21s., 10s. 6d., and 5s., 6d. respectively. Should a watch fail to obtain a certificate in the class for which it is entered, half the fee will be charged. Mr. Whipple informs us that the watches are kept in first-class fire and burglar-proof safes built into the building, and that every watch will be rated under a registered number, so that any maker inspecting the rate-books can get no information about the performances of those of a rival. We can assure our readers that no pains have been spared by the staff to get all the apparatus and arrangements in the most efficient working order, and we only hope that the experiment will prove a success. The Committee are prepared to give it a fair trial, and will not be discouraged at a little backwardness on the part of the trade at the commencement. We think that retailers are more likely to avail themselves of the new facilities than manufacturers, few of whom are able to make remunerative use of testimonials and distinctions, but at present all speculations are premature. Of course foreign makers will not be excluded, as is the case at Geneva and Neuchâtel.

EXTRACTS FROM THE REGULATIONS.

1.—Three classes of certificates, A, B and C, will be granted to watches which pass a satisfactory trial at the Kew Observatory.

CERTIFICATES ARE GRANTED TO WATCHES AS FOLLOWS:—

A. To those which have undergone 45 days' test as specified in the appendix, and whose performance is such that—

1.—The mean difference of daily rate, under the same conditions of position and temperature, has in no instance exceeded two seconds during the period of trial.

2.—The mean daily rate in a vertical position has differed from the mean daily rate in a horizontal position by less than five seconds, and from that in any other position by less than ten seconds.

3.—The mean daily rate has been affected by change of temperature to an amount less than one-third of a second per 1° F., which is about one-half a second per 1° Cent.

The words "*especially good*" will be attached to the Certificate when the difference described in (1) has in no case exceeded 0·75 second, when the differences described in (2) were less than 2·5 and five seconds respectively, and when the alteration of rate described in (3) was less than 0·15 second per 1° F. or 0·2 second per 1° Cent.

B. To those which have undergone 29 days' test as specified below, and whose performance is such that—

1.—The mean difference of daily rate, under the same conditions of position and temperature, has in no instance exceeded two seconds during the period of trial.

2. The mean daily rate in a vertical position has differed from the mean daily rate in a horizontal position by less than ten seconds.

3. The mean daily rate has been affected by change of temperature to an amount less than one-third of a second per 1° F.

The words "*especially good*" will be attached to the Certificate when the difference described in (1) has in no case exceeded 0·75 second, when the difference described in (2) was less than five seconds, and when the alteration of rate described in (3) was less than 0·2 second per 1° F.

C. To those which have undergone 16 days' test as specified below, and whose performance is such that—

1.—The mean difference of daily rate, under the same conditions of position and temperature, has in no instance exceeded two seconds during the period of trial.

2.—The mean daily rate in a vertical position has differed from the mean daily rate in a horizontal position by less than ten seconds.

The words "*especially good*" will be attached to the Certificate when the difference described in (1) was less than 0·75 second, and when the difference described in (2) was less than five seconds.

APPENDIX.

Details of Trials to which the Watches are submitted during Rating.

CLASS A.

The trial of a watch entered for a Certificate in Class A will occupy 45 days, divided into eight periods of 5 days each, and 4 intermediate and extra days during which the watch is not rated.

1st Period.—Watch hanging in vertical position, with its pendant (ring for suspension) up, at the ordinary temperature of the room.

2nd Period.—Watch in vertical position, with its pendant to the right, at the ordinary temperature of the room.

3rd Period.—Watch in vertical position, with its pendant to the left, at the ordinary temperature of the room.

4th Period.—Watch in horizontal position, with dial up, in the Refrigerator, at a temperature of about 40° F. (4° Cent.)

5th Period.—Watch in horizontal position, with dial up, at the ordinary temperature of the room.

6th Period.—Watch in horizontal position, with dial up, in the Oven, at a temperature of about 85° F. (30° Cent.)

7th Period.—Watch in horizontal position, with dial down at the ordinary temperature of the room.

8th Period.—Same as the first, watch hanging in vertical position, with pendant up, at the ordinary temperature of the room.

The intermediate and extra days during which the watch is not rated are at the commencement of the 4th, 5th, 6th, and 7th Periods, which are extended one day each for that purpose, the first day's rate not being taken into consideration.

CLASS B.

The trial of a watch entered for a Certificate in Class B will occupy 29 days, divided into five periods, of which the fourth is an intermediate and extra day.

1st Period.—Watch hanging in vertical position at the ordinary temperature of the room for 14 days.

2nd Period.—Watch in horizontal position, with dial up, at the ordinary temperature of the room for 14 days.

3rd Period.—Watch in horizontal position, with dial up, in the Refrigerator, at a temperature of about 40° F. (4° Cent.) for one day.

4th Period.—Watch in horizontal position at the ordinary temperature of the room for one day, during which its rate is not taken.

5th Period.—Watch in horizontal position, with dial up, in the Oven, at a temperature of about 85° F. (30° Cent.) for one day.

CLASS C.

The trial of a Watch entered for a Certificate in Class C will occupy 16 days, divided into two periods of 8 days each.

1st Period.—As in Class B.
2nd Period.—As in Class B.

Precious Stones.

SAUNIER'S "WATCHMAKERS' HANDBOOK."

THE principal precious stones used in watches, chronometers, and regulator clocks, in their order of hardness, are diamond, ruby, sapphire, chrysolite.

A watchmaker, although he may not have had any previous experience of jewels, can easily ascertain their relative hardness by rubbing one against the other. The softer will be scratched by those that are harder, and the stones that can be marked by a file may be thrown aside as useless.

Diamond.—We shall make a very brief reference to this stone, as it is not used except for the end-stones for balances of chronometers and high-class watches.

Splinters of diamond are employed for drilling materials of a less degree of hardness, and fragments fixed at the end of a rod are used for turning very hard steel; diamond dust is the principal material used for working precious stones, polishing, etc.

Ruby.—This jewel, of a rich velvety red colour, exists in three principal varieties—oriental, spinel, and balas rubies which differ as regards their chemical composition.

From a jeweller's point of view, the value of a ruby is enhanced by its rich colour and transparency; but this is not the case in regard to its applications in horology, for which hardness and capability of taking a high polish are mainly necessary.

The specific gravity of the three varieties are, oriental, 4·2 spinel, 3·7; balas, 3·6.

The first of these is the best, since it is the hardest, both taking a better polish in the first instance and retaining it for a longer period.

In comparison with the other varieties, its specific gravity is greater, and it possesses a brighter colour, but will often be found to be less transparent.

Spinel and balas rubies are frequently met with that are very beautiful to the eye; but their hardness is inferior to that of the sapphire, and even of the chrysolite. They must be carefully excluded from all good work; for, either in consequence of the inferior hardness or of the mode in which the oxide of iron, magnesia, etc., is combined, or of other causes, oil rapidly deteriorates in contact with them, and the moving parts, especially if they are of steel, soon show signs of wear. The rubies themselves also suffer, and it is by no means uncommon, especially in the case of the duplex escapement, to meet with such jewels quite rough and even pitted on their acting surfaces.

False Ruby.—In a certain class of watches, a variety of stones pass for rubies that are known to jewellers as rubicelle, rubace, rock ruby, Brazil, Siberian, or Bohemian ruby, rose ruby, etc., etc., the hardness of which is even less than that of rock crystal. Pivot-holes made of these imitations of the real ruby are worth less than plain brass settings.

Sapphire.—The colour of this stone, sometimes even milky, passes through all the shades of blue. Like the ruby, there are several varieties that differ appreciably in regard to hardness. The hardness of oriental sapphire is equal to that of oriental ruby; both consist of nearly pure alumina coloured by a little oxide of iron; their chemical composition thus being the same, they only differ in regard to colour. It is, then, a great mistake on the part of watchmakers to prefer spinel or balas rubies in place of oriental sapphires. The sapphire is more brittle than the ruby.

The other kinds of sapphire, such as water sapphires, are not true sapphires; they are soft, and should never be used in horology. The density of the oriental sapphire is about 4·01, whereas that of other kinds is only 2·58.

Chrysolite.—Under this name lapidaries include a variety of stones of yellow-green, apple-green, with shades of yellow, and other colours.

That known as oriental chrysolite, which is the same as the oriental topaz, has a beautiful pale yellow colour with shades of apple-green; it is the most highly esteemed. This stone has a sufficiently high degree of hardness for use in watchmaking, as it will scratch rock crystal. Its density varies from 3 to 3·73.

The other varieties, or ordinary chrysolites, come very low in the scale of hardness. They can be scratched by quartz, rock crystal, and even by the file, and are thus of no use for watches.

Agate, Carnelian, Topaz.—Only the varieties of the stones already considered that are termed oriental can be used for the pivot-holes or the pallets of astronomical regulators; but for the escapements of the ordinary time-pieces of commerce, such, for example, as the pallets of Brocot escapements, the topaz, agate, or carnelian may be used. When of the hardest kind, and capable of receiving a high polish, they will very efficiently resist the friction of brass teeth. As to the softer kinds, they are inferior to hardened polished steel for pallets.

WORKING IN PRECIOUS STONES.

The methods adopted for working in the precious stones are in great part kept secret by those who practise them; it is, however, well known to watchmakers that jewels are usually worked and polished with powdered diamond, and the following details will afford all the information necessary to enable the reader to make a jewel of any required form. Where not otherwise stated, the information is taken from a work published by N. Dumontier.*

Tools for working Jewels.—These are all of simple construction, and can be made by any watchmaker if, indeed, he has not them already to hand.

(1.) A small lathe arranged to receive chucks, fixed to the bench or in a vice, and driven by a foot-wheel.

(2.) Two circular laps of copper and one of tin, about two inches in diameter and $\frac{1}{8}$th inch thick; these present a flat face for grinding, smoothing, and polishing the stones, and are adapted to the nose of the lathe.

(3.) A small barrel (that also screws into the nose of the lathe), with six brass covers perforated at the centre, on which to cement the jewel holes, when enlarging, smoothing, and polishing their holes.

(4.) A flat steel circular cutter, $\frac{1}{2}$ inch in diameter, for slitting stones. Also two similar discs, one of copper and the other of tin, of the same size, and having sharp edges, are occasionally useful.

(5.) Two small laps, one of copper and one of tin, to smooth and polish cylindrical stones. These laps are mounted in place of the T-rest, or in the slide-rest, in such a manner that they can be rotated in a horizontal plane by a bow.

(6.) Two chucks adapted to the lathe, on which to cement the jewels for drilling, turning, and polishing.

(7.) A number of small broaches, spindles with concave and convex ends, etc., for smoothing and polishing jewel-holes, convex and concave surfaces.

There may also be added a small steel plug mortar for powdering the diamond, and a flat-steel plate with a block for working up the powder.

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* L'Art de travailler les Pierres précieuses à l'usage de l'Horlogerie et de l'Optique. Paris, 1843.

Selection of Stones.—This is of the first importance. By the aid of a powerful lens or a microscope ascertain that they contain no cracks, air-cavities, or black specks. Avoid stones that are milky, preferring such as are marbled, and in which the directions of crystallization seem to cross one another, as they are the hardest. The hardness may be tested by trying them one against the other; but an experienced workman needs only to note the amount of resistance it offers to the operation of cutting on the lap. The density also affords a valuable means of determining the nature of stones. (See above notes on the several kinds.)

To find the Axis of Crystallization of a Stone.—It is well known that jewels differ from glass in that they form crystals of certain definite forms; they are therefore termed "crystalline," whereas glass is "vitreous." If a jewel-hole is drilled in any direction other than the axis round which the crystal may be assumed to have been formed, there will be difficulty experienced in the drilling and polishing; the edges of the hole will become rough during the act of rounding them off, and the hardness will appear to be irregular. This point seems, however, to be ignored by the majority of jewel-hole makers, although the determination of the most suitable direction presents no difficulty.

Obtain, from any optician, two tourmaline plates cut parallel to their axes of crystallization and with their faces polished. Mount them in a light frame parallel to each other so that each can rotate independently of the other round the axis through their centres; it is convenient if a light spring tends to bring the plates together so that a stone can be held when placed between them. Or such an arrangement can be bought ready made at most opticians': it is known as a tourmaline polariscope. If this instrument be held up between the eye and a light, and one plate be rotated while the other remains stationary, it will be seen that the light becomes gradually greater or less according to the direction of rotation; and further, if the plates be good ones, a point will exist at which there is nearly total darkness.

To examine a stone, cut and polish on it two parallel faces approximately at right angles to the axis of crystallization; his can generally be roughly guessed at by inspection. Place it between the plates (when set at their darkest position), and not only will the light be in part restored, but beautiful coloured rings will be formed. If they are circular the faces of the stone are at right angles to its axis; if not, incline it till the rings become so, and the axis will then coincide with that of the instrument. In case the rings are not observed at all, the stone must again be cut at right angles to the original direction, and the experiment repeated. If they still do not appear the stone is unsuitable for drilling, but may be used for pallets, locking-stones, ruby pins, etc.

The stones to be examined in this manner must be larger than those commonly met with, and if cylindrical rubies can be obtained they are to be preferred, as it is then only necessary to slice them across their axis.

It should perhaps be observed that these precautions can only be taken in making jewel-holes for the higher class of clocks, chronometers and watches. The cheaper class must of necessity be cut in such a manner as their figure may suggest.

Making Jewel-holes.—Having selected twenty or thirty stones of about the same height, cement them to a smooth brass or copper plate, heated to melt the cement. Hold this plate in contact with a revolving copper lap in which the coarser quality of diamond powder has been embedded by means of a hard steel block; the lap is moistened with water.

When one side of the stones is true, soften the cement and, after washing, place them in a vessel containing spirits of wine heated by a lamp; after doing the same to the plate again cement the stones to it with the trued sides downwards, and grind the other faces until the desired thickness is arrived at. Clean the stones and smooth them on the brass lap charged in a similar manner with a finer quality of powder.

The stones are now ready for drilling. This may be done with diamond powder or with the diamond drill, both of which methods will be explained.

To Drill with Powder.—In drilling with powder the stone is fixed with sealing-wax or shellac on a carrier that is adapted to the tool-holder of the slide-rest, this carrier being provided with a vertical slide, so that by the screws in three directions the stone can be accurately centred; it is, moreover, so arranged that the stone can be advanced to or from the drill by pressing with the finger axially. Drill a small hole in the centre of the chuck and, after fixing a piece of steel in it that has been hardened and tempered to a greyish colour, turn a point on it about twice the length of a pivot, to serve as a drill. This point must be slightly thinned backwards to prevent it from choking in the hole and its end should be flat, so as to retain the powder. When the stone is exactly centred, place No. 2 diamond-powder on the end of the drill, and press the stone gently against it, constantly releasing it from the drill for an instant at a time. The hole will be perforated in from eight to fifteen minutes, according to its depth, during which interval the powder should be renewed two or three times. Remove the stone and fix it on the barrel-chuck cover so as to turn true in the lathe; then turn out the oil-cup with a diamond graver of suitable form. See again that the stone is central, and re-centre it if this be found necessary. This is done with the smooth conical end of a soft round broach or a pegwood, a lamp being held under the chuck at the same time.

To use the Diamond Drill.—Having centred the stone on the chuck, as explained in the preceding paragraph, set it in rotation and bring a sharp-pointed diamond graver against its centre, pressing lightly and resting the handle on the T-rest: a minute central mark is thus made in the stone for maintaining the drill axial. Selecting a diamond drill of convenient diameter, moisten it in the mouth and present it to the mark, applying a gentle pressure the amount of which can only be ascertained by practice. It is to be observed that a number of stones should, if possible, be drilled at the same time, for the hand is apt to lose the requisite knack if only one or two are perforated at a time.

Smoothing and Polishing.—When the hole is made through, remove the stone and invert on the chuck. The diameter being less than that ultimately required, pass a brass broach charged with No. 3 powder through the hole, giving it a gentle axial motion while the stone revolves, and taking care to avoid pushing it so far forward as to lock in the stone, and holding it very lightly between finger and thumb. When sufficiently smooth, clean with rotten wood or soft bread, and treat it in a similiar manner with a copper broach and No. 4 powder. Then again clean and use a tin broach and powder No. 5. Next, taking a small bone cone, smooth the angles of the holes: then use a copper wire with rounded end for smoothing the oil-cup (with powder No. 3): follow as explained for the hole with the finer degrees. Using a finely pointed pegwood that passes through the hole, *marry* or round off the internal angle between hole and oil-cup (the powder that remains in the hole being sufficient for this purpose) and do the same to the outer circumference of the cup with a copper spindle of somewhat larger diameter.

Round off external angles with a diamond graver, followed by a copper polisher the end of which is cup-shaped. The flat-face of the stone is polished with a small copper disc and No. 4 powder, pressing it lightly with the finger at the same time that a circular movement is given to it; finish with No. 5 powder. Or the stone may be detached and the flat face polished by working on a ground glass plate, a pegwood point being passed into the hole to form a handle.

Re-set the stone, inverting it, on the chuck, and centring it. The other side is then polished in the same manner, using such tools as its form may require.

Having thus completed the stone, examine it carefully, with a powerful glass to ascertain that the hole is highly polished and the angles rounded off, &c. It is then ready for setting.

Setting Jewel-holes.—Whether it be a plate, cock, or bouchon in which the stone is to be set, the piece must always be cemented to a chuck and the hole accurately centred. Turn it out to a depth corresponding to the thickness of the stone, and make a circular groove round the hole thus made with a round-pointed graver, only leaving a very thin fillet of metal on the inside. The stone should fit easily in the hole, but without play, and should pass in to such a depth that its surface is slightly below that of the plate, etc., when there is an end-stone; in other cases it must of course often depend on the end-shake to be obtained. At the same time it appears desirable that it should always be slightly below.

Clean out the setting and place a small quantity of oil in it to prevent the stone from flying out when made to rotate; or it may be rendered still more safe by a pointed pegwood stick held in the hand. The stone is fixed in position by a small conical burnisher (as, for example, the point of a round broach), very carefully polished so as to avoid all abrading action; if an excess of metal is forced over the surface of the stone it is removed with a graver. The surface of the brass is finally smoothed with hemp-stem or pegwood and tripoli in oil, followed with polishing rouge in spirits of wine.

English jewel-setters often do not turn the groove, but leave a projecting edge round the hole, which is pressed on to the stone with a burnisher.

To make End-stones.—The details already given will enable any intelligent workman to make end-stones. If one of diamond in a brass or steel setting is required, take a small rose-cut stone, turn out a hole in the chuck to receive it, and, after cementing in position, turn off the corners with a diamond graver so as to be able to set it.

For making end-stones of ruby, sapphire or crysolite, flatten a face, using the laps Nos. 1, 2 and 3 in succession, or a plate of ground glass. Then cement with the flat face towards the chuck, and turn to the requisite form with a diamond graver. Polish with the cup-ended brass and copper spindles, and set, if requisite, in the same manner as a jewel-hole.

To make Pallets, unlocking Pallets, etc.—This may be done on the lap or by using files of soft steel, copper and tin. In the first case the stones are roughed out while held by the hand, and the required form is given while holding them in a small carrier that fits into the T-rest support, but the forms of such stones are so various that no special details can be here given. The diamond powders of different degrees of fineness are used, as in making jewel-holes.

To make semi-cylindrical Locking-stones, Ruby Pins, etc.—The stone must first be made approximately cylindrical on the lap No. 1, so that it may be turned with the diamond graver. Drill a hole in the chuck, cement the stone in it, and turn it in this manner. When true and of the requisite length and diameter, round off the outer end and smooth with a cup-ended spindle, then polish with powders 3 and 4 successively. Round off the sharp corner with a cup of rather greater curvature. The cylindrical surface is polished by means of a small lap, carried on a vertical spindle in a frame fixed in the T-rest support, and caused to rotate rapidly with a bow, the lathe-head, also revolving at the same time. The lap-carriage should have a vertical screw adjustment, so that it may be brought just into contact with the stone; it is supplied with the several degrees of powder in turn. Now drill a hole in another chuck of the diameter of this cylinder, fix it in position and finish off the opposite end.

To form the flat face along the axis of the stone it is cemented to a support in place of the T-rest and brought against the revolving lap in the lathe; or the same result may be attained by using a brass file.

To mount Diamond Drills and Gravers.—Drill a hole or file a notch in the end of a piece of brass wire to correspond with the fragment of diamond; heat the end in a spirit lamp and lay on it a piece of good sealing-wax or shellac. When this commences to melt, set the diamond in position and leave the whole to cool. Diamond drills are very commonly mounted at the end of a pin that has had its point filed off; mark a point on the end with a graver and drill the hole, which should be very shallow. Holding the pin in a pin-vice with its point projecting about one-tenth inch, heat the vice in a lamp, and proceed as above explained.

Trade Notes.

The entire revenue derived from the taxation of the gold and silver trades may be stated at £121,000. The duty on gold produces £26,000, and the licences £45,000.

We have much pleasure in announcing that the Goldsmiths' Company have forwarded a donation of twenty-five pounds to the funds of the Watch and Clock Makers' Pension Society.

A bi-monthly Spanish Horological Journal, entitled *Platería y Relojería*, was started in Tarragona, on March 1st. The matter it contains is useful and interesting, and it is receiving the support of influential advertisers. We wish success to our new contemporary, the proprietor of which is J. Herrmann.*

Apropos to the above, we note the following report from the Swiss Consul in Barcelona, as published in the *Revue Chronomètrique* :—

"The Swiss manufacturers maintain their position in Spain; they almost exclusively command the market for gold and silver watches. It is, however, necessary to say that the importers take much trouble to satisfy the Spanish taste, which constantly demands novelties. Great importance is attached to the external appearance of the watch; the form of the case and its decoration determine the decision of the buyer. Watches are not bought in Spain with the intention of being worn a number of years, but are regarded as objects of fashion, and a Spaniard will easily allow himself to be persuaded to buy a new one, or exchange the old one, if some novelty is offered him. Therefore, only those manufacturers who are constantly producing novelties, and designing new decorations, who send original consignments pleasing to the taste of the country, will be able to obtain profits from their relations with Spain."

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* Not our old correspondent.

The Patents, Designs, and Trade Marks Act of 1883.

BY C. STUART MURRAY.

(*Continued from page* 144.)

IN the paper in the April number of the *Watchmaker* I stated that the Act introduced an entirely new feature in patent law, namely that the Board of Trade can compel a patentee to grant licenses to work a patent upon reasonable terms in the event of his not working it himself, that is, that patents can no longer be allowed to lie dead either by inability or dog-in-the-manger obstinacy of the inventor. I will here add that the decision upon the point by the Board of Trade is final, there being no appeal of any kind whatever.

Another new feature is that the patentee, or whoever may have a working interest in the matter, shall do their own writing, for this reason. There will be kept at the Patent Office a book, called the Register of Patents, wherein shall be entered the names and addresses of grantees—the persons to whom grants are made—of patents, notifications of assignments, and of transmissions, licenses, amendments, extensions, revocations, and such other matters affecting the validity or proprietorship of patents as may from time to time be prescribed. It is to be borne in mind that this register will, in law, be *primâ facie* evidence of any matters either directed by the Act or authorised to be inserted in it. And here comes the alteration that has just been alluded to about the writing. It is specifically laid down that copies of deeds, licenses, and any other documents affecting the proprietorship in any patent, or in any license under it, *must be supplied to the Comptroller* in the manner laid down for filing in the Patent Office.

We now come to the all-important subject of fees. The Act lays down that there shall be paid in respect of the patent the fees that are laid down in the Schedule, and also such fees in other matters connected with it as are prescribed by the Board of Trade under the sanction of the Treasury; and the same board may from time to time, if they think fit, with the consent of the Treasury, reduce any fees. Those fees will be found in the following table, which for convenience sake is inserted here:—

LIST OF FEES PAYABLE ON AND IN CONNECTION WITH LETTERS PATENT UP TO SEALING.

	£	s.	d.
1. On application for provisional protection...	1	0	0
2. On filing complete specification	3	0	0
or—			
3. On filing complete specification with first application	4	0	0
4. On appeal from Comptroller to law officer. By appellant	3	0	0
5. On notice of opposition to grant of patent. By opponent	0	10	0
6. On hearing by Comptroller. By applicant and by opponent, respectively	1	0	0
7. On application to amend specification:—up to sealing. By applicant	1	10	0
8. After sealing. By patentee	3	0	0
9. On notice of opposition to amendment. By opponent...	0	10	0
10. On hearing by Comptroller. By applicant and by opponent, respectively	1	0	0
11. On application to amend specification during action or proceeding. By patentee.	3	0	0
12. On application to the Board of Trade for a compulsory license. By patentee ...	5	0	0
13. On opposition to grant of compulsory license. By patentee	5	0	0
14. On certificate of renewal:—before the end of four years from date of patent ...	50	0	0
15. Before end of seven years; or in the case of patents granted under the "Patents Designs, and Trade Marks Act, 1883," before the end of eight years from date of patent	100	0	0

Or in lieu of the fees of £50 and £100 the following annual fees:—

	£	s.	d.
Before the expiration of the 4th, 5th, 6th and 7th year from the date of the patent, for each year	10	0	0
For the 8th and 9th years before their expiration, for each year	15	0	0
Before the expiration of the 10th, 11th, 12th and 13th years, for each year	20	0	0
26. On enlargement of time for payment of renewal fees:—Not exceeding 1 month...	3	0	0
27. Ditto 2 months...	7	0	0
28. Ditto 3 months...	10	0	0
29. For every entry of an assignment, transmission, agreement, license, or extension of patent...	0	10	0
30. For duplicate of letters patent, each ...	2	0	0
31. On notice to Comptroller of intended exhibition of a patent, under Section 39 ...	0	10	0
32. Search or inspection fee, each	0	1	0
33. For office copies, every 100 words beyond the first shilling (not less)	0	0	4
34. For office copies of drawings, the cost to be according to agreement.			
35. For certifying copies in either manuscript or printed, each...	0	1	0
36. On request to Comptroller to correct a clerical error	0	5	0
37. For certificate of Comptroller under Section 96	0	5	0
38. For altering address in register	0	5	0

And that is all in the way of money payment for everything.

"Boiling down" an Act of Parliament into the language of business life is far from agreeable work. The repetitions and the wordiness, however necessary they may be for legal purposes, are far from entertainments to the general reader. Things that one would think might be very well grouped together are scattered over various parts of the Act, so that the consulter has to hunt for them, as it were. The numbers on the margin of the fee-table are merely for the purpose of easier reference to the table itself, and for nothing else. At No. 31 we read of the fee to the Comptroller of the intended exhibition of a patent, and are referred to Section 39, although the fees are mentioned in Section 24, with a reference to the schedule. All schedules of Acts are printed at the ends of the Acts themselves, and the reader is always referred, as we are above, to sections that may be anywhere within the four corners of the legal document. I have often thought when I have been engaged in the boiling-down process, as I am at present, that it would be a "handy" improvement to have the referred sections printed as near to the schedules as practicable, and that might be close to the ends of the several Acts. For instance, this Act consists of 117 sections, and when we reach the schedules we are at once told to "look up" Section 39, and after that Section 96. As I do not like to break the continuity of the composition, I will leave the sections to come on in their proper order. But about this term *schedule:* not many days ago I happened to be in company where the new law came up for conversation, and of course the schedules. An inquiring mind asked what was the original and root meaning of schedule; why it was so called in Acts of Parliament, and in so many matters; and the querist wanted some one to tell him why a man was said to be "scheduled" in the Bankruptcy Court, and why Acts of Parliament had schedules. Some of us essayed an answer, and some of us looked down the sides of our noses—and even blew them—but no one seemed to be able to give a satisfactory definition. It was ultimately agreed that I should refer it to "a friend in the City who does these things," and this is the result. "Schedule" is derived from the Greek root *sche-de*—anything formed by cleaving a leaf, *schedu*, a strip of papyrus, *shedul*, a small leaf, a list of goods, an inventory, &c. &c.; and with that we were all contented. We will now return to, to—*our law*.

A patentee may, after advertising, in manner directed by any rules made under this section, his intention to do so, present a petition to Her Majesty in Council praying that his patent may be extended for a further term; but such petition must be presented at least six months before the time limited for the expiration of the patent. Any person may enter a caveat, addressed to the Registrar of the Council at the Council Office, against the extension. If the Queen shall be pleased to refer any such petition to the Judicial Committee of the Privy Council, the said committee shall proceed to consider the same, and the petitioner and any person who has entered a caveat shall be entitled to be heard by himself or by counsel on the petition. The Judicial Committee shall, in considering their decision, have regard to the nature and merits of the invention in relation to the public, to the profits of the patentee as such—profits that have been made and are running—and to all the circumstances of the case. If the committee report that the patentee has been inadequately remunerated by his patent, it shall be lawful for Her Majesty in Council to extend the term not exceeding seven or, in exceptional cases, fourteen years; or to order the grant of a new patent for the term therein mentioned, and containing any restrictions, conditions, and provisions that the Judicial Committee may think fit. The same committee may make, from time to time, rules of procedure and practice for regulating proceedings on such petitions, and to be regulated according to the practice in patent matters of the committee. The costs of all parties in connection with every proceeding before the Judicial Committee is vested in the committee's discretion, and their orders upon the subject are to be enforceable in law as if they were orders of a division of the High Court of Justice.

We now come to a somewhat weighty part of the Act, namely, the revocation of a patent which considerably affects the patentee. There was in the old law a proceeding to repeal letters patent, known by the name of *scire facias*—"you are to let know." This form of the judicial writ was to call upon a person to show cause why the execution of a judgment should not issue against him,—that is, that he was "let know" that unless he could show sufficient cause the decree of the Court would issue. Hence the term was applied to the old proceeding for the cancelling or recall of letters patent. The new law lays it down that revocation of a patent may be obtained upon petition to the Court. Every ground on which a patent might, at the commencement of this Act, be repealed by *scire facias* shall be available by way of defence to an action for infringement, and shall also be a ground of revocation. The procedure, however, by *scire facias* to revoke a patent has been abolished. As it was not often put into practice, it had become obsolete.

A petition for the revocation of a patent may be presented by the Attorney-General in England or Ireland, or the Lord-Advocate in Scotland, or by any person authorised by either of them. Any person alleging that the patent was obtained in fraud of his rights, or of the rights of any person under or through whom he claims, or stating that he or the person through whom he claims was the true inventor of anything included in the claim of the patentee, or that he, or any person through whom he claims an interest in any trade, business, or manufacture, had publicly made, used, or sold before the date of the patent anything claimed by the patentee as his invention. The next is that the plaintiff must deliver with his petition particulars of the objections on which he means to rely, and no evidence shall, except by leave of the Court or a judge, be admitted in proof of any objection of which particulars are not so delivered; but delivered particulars may be amended from time to time by leave of the judge or of a Court. In the opening of the action the defendant or holder of the letters shall be entitled to begin, and to give evidence in support of the patent, and if the plaintiff or objector gives evidence impeaching the validity of the patent, the patentee shall be entitled to reply. In truth this mode of procedure indicates a form of the old maxim of possession being nine points of the law, and also changes somewhat a rule of logical disputation, to the effect that he who lays down a proposition must immediately proceed to prove it. In the new law the position of the parties is reversed. The petitioning plaintiff says, "Your patent is bad;" but, instead of being called upon to prove it, the patentee defendant answers, "It is not bad," and at once sets about to establish his case.

When a patent has been revoked on the ground of fraud the Comptroller may, on the application of the true inventor made in accordance with the provisions of the Act, grant to him a patent in lieu of and bearing the same date as the date of the revocation of the now-illegal patent. But the new patent is to cease upon the expiration of the term for which the revoked one was granted. That is a point which will be of much value to the true inventor, as it effectively shuts the door against unprincipled persons running behind his patent, as it were, and getting it cancelled without his having any but a most expensive mode of redress. Many a struggling patentee has been ruined by rascality in this very way.

I will now call attention to the new and very much altered position of the public service, or what is technically called "the Crown" by the new law. It is laid down that a patent shall have to all intents the like effect against the Crown as it has against a subject. In the old law the Crown had the free use of every patent, and great was the hardship often inflicted thereby. That was more especially the case with respect to inventions in firearms, gunpowder, cartridges, anchors, etc., that were used for the public service. I have known several cases bearing upon the invention of cannon in which the patentees could not really help themselves at the time. The only chance of redress was by what is known as a "Petition of Right," which had to be presented to the Sovereign by leave, I think, of the Attorney-General. It was then referred to the Judicial Committee of the Privy Council. If the Committee advised in favour of the petitioner, then the Queen signified acquiescence by endorsing the document that had been presented to her with the words, "Let right be done." The next part of the affair would be the ascertainment of the value of the right, and after that a Treasury warrant for the payment of the money that had been granted. The new law has changed all that. The officers or authorities administering any department of the service of the Crown may by themselves, their agents, contractors, or others, at any time after the application, use the invention for the service of the Crown on terms to be before or after the use agreed upon, with the approval of the Treasury, between those officers or authorities and the patentee, or, in default of such agreement, on such terms as may be settled by the Treasury after hearing all parties interested.

(*To be continued.*)

A Handy Portable Gas Stove.

Having had occasion lately to call at Mr. Mather's, the well-known practical gas-engineer of Brownlow-street, near Bedford-row, Holborn, we noticed a very handy portable gas stove. Now that we are looking for coal fires to have a lengthened holiday, we believe that we are conferring beneficial information upon our readers by introducing the substitute for smoke and ashes to them, the more especially as it is well adapted to the many purposes connected with the trades represented by this journal. The stove that we saw, although there are much larger ones, is made of fire-clay slab, about twelve inches square, divided down the centre into channels fitted with asbestos. The asbestos is kept burning by gas-jets from a pipe fixed along the bottom. The gas, on its way to the burners, mixes with air in an air-chamber, which mixing prepares it for immediate conversion into heat with very little light, much upon the principle of our old acquaintance, the Bunsen burner. There is a ventilating-pipe at the back to carry off the products of combustion, and altogether the stove is well adapted for use on the bench, or for keeping a closet or small office at a comfortable temperature. We do not say that this form of the gas stove is absolutely new, but that those sold by tradesmen of Mr. Mather's long-established status can be fully depended upon. There is also a gas regulator under a warranty that it will effect all that is put forth on its behalf; furthermore, Mr. Mather's word may be confidently relied upon in every way.

C. S. M.

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A Valuable General Yearly Reference Book.

Nothing is more frequent than for seekers after current knowledge and bygone information to ask, "Where can I find so-and-so?" "When was such-and-such an Act of Parliament passed?" etc., etc. I am continually referring inquirers to the best authority in that way that I know, and that is the *British Almanack and Companion*. That volume consists of nearly four hundred pages, and may be looked upon as an history of the empire in epitome. For instance, there is the Almanack proper, which, had it stood by itself, might have been mentioned at the usual time for such matters; but we are dealing now with the whole volume as a reference book, valuable to retain when the year has gone by. As an instance of this value I may state that the work was commenced in 1828, and that complete and perfect sets are always saleable. It was originally published by the late Charles Knight, and is now the property of the Stationers' Company. The Almanack part consists of astronomical notes of various kinds, the calendar, government, peerage, and legislature, Scotland, Ireland, Church and education, army and navy, law and justice, commerce and taxation, and miscellanies. In the *Companion* for the year there is a series of both interesting and scientific papers by writers who have been specially selected on account of their knowledge of the subjects dealt with.

In Part I. there are papers upon meteorology, fish-culture, longevity, migration of birds, social science, public health and sanitation, food supply, and musical festivals. In this part will be found a description of the work done at the Kew Observatory, the Great International Fisheries Exhibition, thrift, the Channel Tunnel, the dwellings of the poor, and others. In Part II. we have architecture and public improvements, art exhibitions, provincial congresses, science, music, philanthropy, legislation, chronology, and necrology. There is the architecture of the year, and among other things a table of the public general Acts of Parliament that have been passed during the session. Part III. gives abstracts of important Acts of Parliament of the session, abstracts of Parliamentary and other official documents, a chronicle of events and occurrences, and a table of the deaths of public persons.

Taking the *British Almanack and Companion* altogether, after having been a regular consulter of it for many years, I can safely say that there is no volume like it, and there has been no volume like it for the wide and varied information belonging to the every-day life of practical knowledge.

C. S. M.

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Ancient Gems and Gem Engravings.

By James Prendeville.

(*Continued from page* 128.)

THE plain truth is, that Moses,—who, as being reared in the court of Pharaoh, and educated among the priests, the great depositories of the knowledge of the country, "was skilled in all the learning (or arts) of the Egyptians,"—here mentions the use of a highly prized and elegant art (long before this practised in Egypt) for the decoration of the priest's vestments; and that Bezaleel and Aholiab were called by God's will, as being superior artists (every excellency in knowledge being supposed to be the gift of God), to execute the work. It is not reasonable to suppose that the Jews, who were so long conversant with the Egyptians, and were originally brought to Egypt under such favourable auspices, introduced there by Joseph, the favourite and chief minister of the king, and were subsequently employed as workmen, should be ignorant of their arts; at all events, Moses evidently was not; nor did he fail to encourage among his people as much of the arts and institutions of Egypt as might be adapted to their peculiar condition, and subsidiary to their interest. In subsequent stages of the Jewish history, we find engraving practised, not so much for ornament and luxury, as for necessary use. No writing was considered authentic, unless accompanied with a seal. Thus, when Jezebel wrote a letter in the name of Ahab, she impressed it with the prince's seal, to ensure the prompt and certain execution of her orders. The same custom prevailed in Persia; for we find Ahasuerus presenting his ring to Esther, as a pledge of his confidence.

The Jews were great admirers and collectors of precious stones. It has been asserted that they were acquainted with all the varieties of them known in the present day. St. John, who is full of the style and imagery of the ancient prophets, says, in the Apocalypse (ch. xxi.), that the foundation of the new or heavenly Jerusalem was decorated with precious stones: "And the foundations of the wall of the city were garnished with all manner of precious stones: the first was jasper; the second, saphire; the third, a chalcedony; the fourth, an emerald; the fifth, sardonyx; the sixth, sardius; the seventh, crysolite; the eighth, beryl; the ninth, a topaz; the tenth, a chrysoprasus; the eleventh, a jacinth; the twelfth, an amethyst: and the twelve gates were twelve pearls." Though the Bible mentions, in different places, the names of the several precious stones known to us, yet antiquaries and commentators disagree as to the correctness of our translation of the original names; for instance, the translators of our Authorised Version say, the first row of stones in the breastplate of the high-priest consisted of a *sardius*, a topaz, and a *carbuncle*; while others say, they were a *carnelian*, a topaz, and an *emerald*. But it was not merely for ornament that the Jews used hard, engraved stones: we find that they used cut stones as implements of use. In Exod. iv. we find that they originally used stone knives for the operation of circumcision. In the use of such instruments they were neither original nor singular; for Herodotus (b. ii. c. 2) tells us, that the early Egyptians used such implements to open the bodies of the dead who were to be embalmed; and Pliny (b. xxxiv. c. 12) and Catullus (in his poem on Atys) show that the priests of Cybele used them in order to emasculate themselves.

The art was long practised by the Egyptians before it was *generally* known to the Jews; and probably by the Indians before it was known to the Egyptians. The extensive trade and intercourse between Egypt and India, which was called by the old historians the *land of gems and gold*, tended immensely to circulate wealth and a knowledge of the arts (especially of engraving) in Egypt. That India yielded a vast source of riches, luxury, and scientific knowledge to the Egyptians, is a fact established by the concurrent testimony of the most trustworthy writers. "India, from the remotest ages, produced (says Raspe) the best specimens of hard and precious stones which lapidaries and engravers work on, together with every substance and tool they use in their operation: the *real diamond* (which is at once both a material and an instrument), the ruby-sapphire, the emerald, topaz, chrysolite, sardonyx, chalcedony, onyx, carnelian, jasper,—nay even, besides the *real diamond*, the stone called the *diamond spar*, which, when pulverised and applied to the engraver's or lapidary's tool, cuts the hardest gems nearly as well as the diamond powder, and much more effectively than the best emery." Raspe confidently asserts (and from the great research he appears to have bestowed on the subject, his opinion is entitled to great respect, if not implicit belief) that neither Egypt, nor any other country of the old world, except India, produced the *real diamond*, or the diamond spar, without which the lapidary's art could not be brought to perfection; and that from India this stone, and a knowledge of its properties, so necessary for gem-engraving, spread to the Western nations. Not only did the ancient Indians furnish other nations with precious stones, but they carried the art of engraving on them to a high order of excellence, as many specimens of engraved gems now preserved amply testify.

Without entering into details of the great traffic between India and Egypt in remote ages, and of the advantages accruing to the Egyptians from it, we may mention one surprising fact (as evidence of the wealth of India) which is recorded by the best authority—the Bible (Chron. viii. 18; 1 Kings ix. 26)—*i. e.* that Solomon brought, through the Red Sea, from Ophir (or India) in one voyage, no less than *four hundred and fifty talents* of gold, *i.e.* about £3,240,000 sterling.

Among the principal commodities introduced into Egypt from India and other countries of the East, were *precious stones*. But the Egyptians were not exclusively dependent on foreigners for an imported supply of these articles. Their own mines furnished a vast abundance of emeralds; and these mines were worked so early as the reign of Amunoph III., or 1,425 years before Christ. Wilkinson says (vol. i.): —"That the riches of the country were immense is proved, among other evidences, by the vast quantity of jewels, in gold, silver, and *precious stones*, and other objects of luxury in use among them in the earliest times. Their treasures, and cultivation of the arts (especially the art of engraving and working costly stones), became proverbial through the neighbouring States; and pomp and splendour continued to be their ruling passion till the close of their existence as an independent nation, as is fully demonstrated by the history of the celebrated Cleopatra."

Hieroglyphics may be termed the originals of engraving. Warburton, who has treated the subject of hieroglyphics with his usual ingenuity, has classed them under three heads. He says, the *first* design was to make a part represent the whole: thus, two hands, one holding a bow, the other a shield, represented a battle,—a man casting arrows, a tumult or insurrection,—a scaling-ladder, a siege, etc.

The second and more artificial method was, to put the *instrument* of a thing, whether real or metaphorical, for the *thing itself;* thus, a prominent *eye* represented God's *omniscience*—an *eye and sceptre*, the duties and powers of a *monarch* —a *ship and pilot the Governor* of the *Universe*, &c.

The third and still more artificial method was, to make *one thing* stand for *another*, where any resemblance or analogy could be collected from the form, nature, or qualities of beings and things, or from traditional superstitions: thus, a *serpent* in a *circle* represented the *universe*, its *spots* designating the *stars*—the *eyes* of a *crocodile, sunrise*, because the eyes appear to emerge from the animal's head—a *black pigeon* expressed a *young widow*, who would not take a second husband—a *blind beetle*, one *dead* from *fever*, or a *sunstroke*—a *sparrow* and *owl*, a *suppliant* flying for protection, and not finding it—a *vulture*, an inexorable *tyrant* estranged from his people—a *grasshopper* (which they imagined had no mouth), one *initiated* into the *mysteries*. So the (*sistrum*, or rattle, which was often placed in the right hand of Isis, was rattled to announce the *swelling of the Nile;* and the *situla*, or water-ewer, was the symbol of the *retirement* of the *inundation*. The *persea*, which was often an ornament to the head of the deities, expressed the *blessings of husbandry;* because the tree, when growing (according to Galen) in its native country, Persia, produced a poisonous fruit; but when transplanted to Egypt, and there carefully cultivated, it yielded a pear-like fruit which was good for eating. So, a *peach-tree* in luxuriant fruit was expressive of *one* who *profited* much by *long travelling;* for the peach-tree was said to be more fruitful when transplanted, than in its native soil. So, a *squatting hare* indicated a *melancholy man;* for the hare is a timid and solitary animal. Among the hieroglyphic inscriptions on gems and in the temples, the *eye* was a frequent figure, sometimes without eyebrows, sometimes marked only by two eyelids, without a pupil appearing: sometimes it was adorned with wings, or other expressive attributes, which shows that the same symbol represented different ideas and modifications of meaning. It is the most simple image of vision, and consequently of wisdom and providence; and it is thus applicable to the *sun*, and to the *Divinity*. Diodorus and Plutarch expressly state, that it was particularly the symbol of Osiris. The sphinx was always an emblem of the Divine power, or kingly power as the earthly representative of the Divine, in different aspects of observation. Though no object so often occurs among the hieroglyphics as the sphinx, yet no decisive or satisfactory explanation of it has been given in its various forms. In general, however, it may be said that, as the Egyptian sphinx presented the head of a *lion* and a *man*, it was typical of power and wisdom: the figure of the lion being indicative of power; and the figure of the man indicative of intelligence.

(*To be continued.*)

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The Kew Observatory,

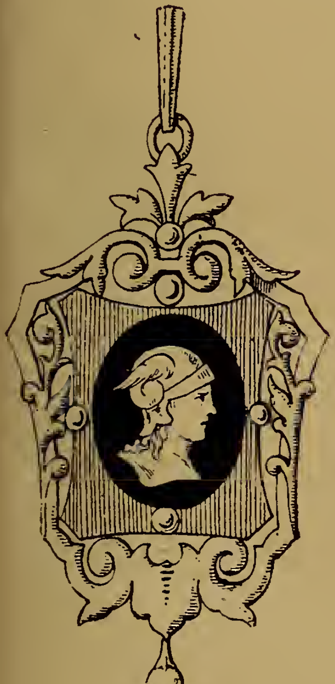
RICHMOND, SURREY.

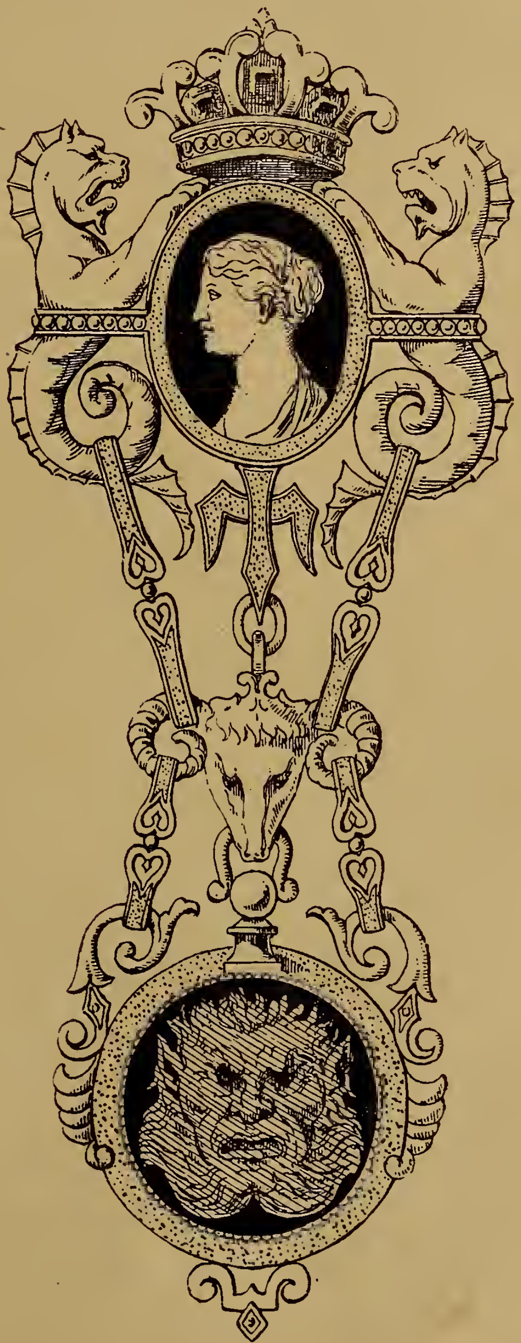
THE WATCH-RATING DEPARTMENT IS NOW OPENED.

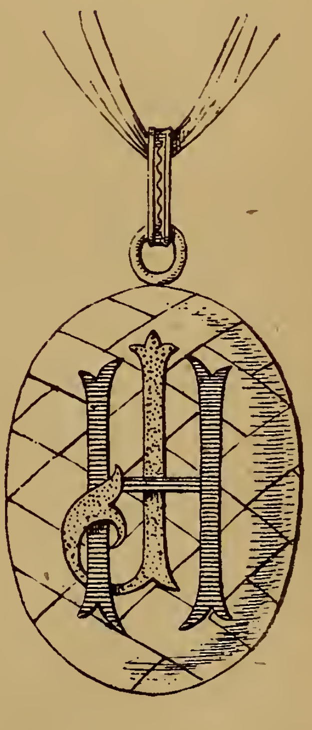
Full particulars as to Regulations, Fees, Certificates, and Rate-Statements, post free on application to the Superintendent.

Supplement to the Watchmaker, Jeweller, and Silversmith, May, 1884.

MONTHLY SUPPLEMENT OF DESIGNS.







THE
WATCHMAKER
JEWELLER
AND SILVERSMITH

EDITED BY JAMES U. POOLE.

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ILLUSTRATED SUPPLEMENT:—"Designs for Modern Jewellery."

Parliamentary Debate on the Gold and Silver Plate Duties.

IN the House of Commons, on the 8th ultimo, Mr. Slagg, M.P. for Manchester, rose to call attention to the duties on gold and silver plate, and also to the system of compulsory hall-marking. He thought he was perfectly justified in characterizing the laws and regulations which related to the trade in the precious metals as barbarous, and as affecting the trade and industry in a very injurious manner. He looked in vain for any compensating advantages in regard to these enactments. It was of course alleged that they protected the purchaser and gave a guarantee of quality. If so, there would perhaps be some excuse for them; but he thought he could show the House that they failed in doing anything of the sort. It was some six centuries ago since these restrictions were first imposed. They belonged, in fact, to an era in the history of our commerce when restrictions and regulations were placed upon the quality of nearly every article. The public was no doubt compelled in regard to the quality of every commodity it purchased to take such precautions to safeguard itself as might be necessary; but, as he had said, these laws were no safeguard in that respect. Our colonies and America and other countries had got rid of enactments of this sort, as it had been found that they were no longer necessary in the interest of commerce. In this country the trade in the precious metals was languishing and almost daily expiring under the influence of these laws (hear, hear), while in America the trade was rapidly increasing; and, what was a still more serious consideration, our best workmen were going there because their abilities could find no scope in this country. It was not possible, for want of time, to go into these laws in any detail, but he might state that they imposed generally speaking the following conditions:—That all gold and silver, with the exception of certain articles manufactured in the United Kingdom, should be assayed and stamped, the cost of the stamp being 17s. an ounce for gold and 1s. 6d. an ounce for silver. There were five legal standards for gold—namely, 22, 18, 15, 12, and 9 carats, and for silver two—namely, 10 oz. 12 dwt., and 11 oz. 2 dwt. If manufactured articles were found not to be up to the legal standard, it was allowable to the authorities to break them up entirely. As a matter of practice, silver goods were received in a rough state to be hall-marked, and then taken back to be manufactured. The next question was what was the advantage accruing to the revenue from all this tremendous machinery. It was but a trifling amount, and he was sure the Chancellor of the Exchequer would hardly assure the House that it was worth retaining at the cost and burden it imposed upon the country. (Hear, hear.) The duty had gradually but surely effected the extinction of the silver trade from England, though it might be said that the decline was to some extent due to the large increase in electro-plated articles. That might be so, but he could not think it was wholly accounted for in that way. As to the guarantee to the buyer, he knew it was commonly supposed that in buying hall-marked silver the purchaser obtained a valuable security for the quality of the article he bought. But that was not the case as a matter of fact. Imitations were made with very great skill, and with so much ingenuity as almost to defy the detection of competent experts. If that were so, surely the last vestige of argument in favour of these laws disappeared. This question was also one of great importance in regard to the interests of India. (Hear, hear.) By the present system we practically refuse to receive the silver productions of that country. (Hear, hear.) When Indian silver articles were presented at our Custom-houses, if not up to the required standard of Goldsmiths' Hall the articles were liable to be smashed up, and this right was sometimes exercised. At best the articles were refused admission and were sent away again. This was a crying injustice. (Hear, hear.) We had made India drop its duties on imported goods from this country, and we ought to take steps to give them a free market for their silver goods. (Hear, hear.) The revenue derivable from this source was really very small: it only amounted to about £83,000 a year. The question of the drawback was of course a difficulty in the way of immediately abolishing the tax, but he was informed that the dealers in gold and silver would be willing to take £100,000 in full discharge of their claims for drawback and apportion it among themselves. All the best authorities and soundest economists were in favour of abolishing these duties at the earliest date. He did not desire to prevent purchasers who wanted to have goods hall-marked as a guarantee from getting them, but he objected to the hall-mark being made compulsory. By the maintenance of this system they were inflicting a serious injustice on the trade and perpetuating an economic heresy. (Hear, hear.)

Mr. Gorst believed that it was admitted on all hands that this tax ought to be abolished. The Government themselves had, in three successive years, proposed to abolish it. The only reason that it existed appeared to be the difficulty of dealing with the question of drawback. If, as the hon. gentleman stated, £100,000 could settle this matter, the Chancellor of the Exchequer would, he thought, be delighted to settle it on those terms. But whether that sum would or would not be sufficient, he thought that if sufficient pressure in that House was only brought to bear on the Government they would find some way of getting rid of the drawback. It was most important to encourage as far as possible such manufactures as now existed in the country, and it was greatly to the advantage of the people of India that every stimulus should be given to all the manufacturing industries which now existed. (Hear, hear.) In India there was a remarkable industry in the manufacture of Indian silver articles, and it was highly desirable that the trade should receive as much encouragement as possible. No doubt, if it were not for the hall-mark an enormous trade might be done in this country of the silver articles manufactured in India. He would ask the Chancellor of the Exchequer whether a special law could not be passed for the assay of Indian silver articles, so as to prevent the shameful incident mentioned by the hon. member for Manchester with respect to the articles bought in this country made of rupee silver, and which were smashed up and destroyed. That was a matter which might be dealt with without the abolition of the duty, and without the Chancellor of the Exchequer incurring any fiscal loss whatever. He hoped members of the House would press upon the Chancellor of the Exchequer the extreme importance of this matter, especially from the Indian point of view, and that they would not have to wait long before justice was done to India. (Hear, hear.)

Sir G. Balfour said the House was indebted to the hon. member for Manchester for having brought forward a question of very great importance to India. When he recollected that for two years India had removed all import duties, and that goods to the value of £35,000,000 had been freed from duty, he had said enough to show the importance of the sacrifice which India had made. (Hear, hear.) He thought the example which India had set in this matter was one which put England to shame, especially when they considered that this country had taken pride in hitherto being foremost in advancing the principles of free trade. He wished, however, to do justice to the Prime Minister and to the present Chancellor of the Exchequer. In 1881-2 the present Prime Minister in his Budget speech strongly advocated the abolition of the duties on silver brought to this country, and the Chancellor of the Exchequer in his Budget speech of 1883 had also advocated the same course. The objections which had been raised by both right hon. gentlemen were on account of the large sum which it would be necessary to pay with respect to the drawback. The Prime Minister had stated that the drawback would amount to £160,000 or probably more, and the Chancellor of the Exchequer had stated that a sum ranging between £120,000 and 200,000 might be the sum demanded. But he desired to point out that they were not now fighting for the abolition of the duty, because it had been admitted that this relief should be given, but only in regard to the amount of drawback which it was necessary to pay. By a comparison of figures the hon. member showed that this would not be so large as had been paid in the case of other duties which had been repealed, such, for instance, as the duties on glass, bricks and tiles, soap, and paper. In the case of soap there had been no drawback at all, and in the case of the other articles the drawback paid had amounted to but a fraction of the annual duty upon each of this class of goods. He thought that £120,000 would cover all the claims that would be made on account of drawback. In the case of a country which had been so liberal in admitting English manufactured goods free of import duty, he thought he was justified in making an urgent appeal on behalf of a similar favour being extended to Indian manufactured silver articles. (Hear, hear.) The important point was that probably in the history of the world they had never had such an example as that which had been set by India; and they had also had the Government in India and successive Secretaries of State for India all strongly appealing to the Treasury to abolish the duties on silver plate—a measure which would be but a fair and just return for the great benefits conferred on the industries of the United Kingdom by the repeal of the import duties on our produce and manufactures entering India. The justice of that demand had been over and over again admitted, and if the Chancellor of the Exchequer meant to do any good in the matter it was to be hoped that he would now speak out plainly. It would be unworthy of a Liberal Government which had hitherto professed free trade principles not to deal fairly and justly by India on that subject. (Hear, hear.)

Mr. Anderson (who was interrupted early in his remarks by an unsuccessful attempt to count out the House) objected to the suggestion which had been made that the Chancellor of the Exchequer should pay £120,000 to settle the drawback. Such a proceeding would not be justified. He held that there ought to be no drawback. Even if the amount of duty-paid stocks in hand in 1881 was very large, the amount in hand now must necessarily be a very great deal smaller than it was then. The duty was 1s. 6d. per ounce, but from that there was a rebate of 3d. on the ground that the plate was sent in to be hall-marked unfinished, and that there was a certain loss of weight in finishing it. The result of that was that the makers contrived to send in their plate so nearly finished that there was much less loss in finishing it than the amount of the rebate they received; and in that way they got a considerable profit. They had thus made by the rebate nearly if not quite as much as they could fairly claim in drawback on unsold goods at the present time. Again, the sudden expansion of the trade which would immediately follow the abolition of the duty would in a very short period recoup them for the loss of the drawback. The House was, he thought, bound to consider India in that matter; and he entirely agreed in the appeal which the hon. and gallant member (Sir. G. Balfour) had made on behalf of that great dependency. It was not, however, necessary to abolish compulsory hall-marking, but it would be necessary to give a special hall-marking suitable for rupee silver, that being the quality of which the bulk of the Indian manufacture was made. The public should have the benefit of such a guarantee as hall-marking was for the value of the goods they bought. At present there was practically no hall-marking of gold except in the case of wedding-rings and snuff-boxes. The snuff-boxes given to the hon. member for Bridport for blocking Bills in that House would not furnish much revenue to the Chancellor of the Exchequer (A laugh.) As to wedding-rings, they were constantly sold at prices which did not admit of paying the duty; and it was probable that many of them came from abroad fictitiously hall-marked. He did not think that, under the present circumstances, there was any ground for allowing a drawback at all, and he thought that the Chancellor of the Exchequer should throw the question overboard altogether.

Alderman **Lawrence** said that it seemed to him a remarkable thing that all the speeches which had been made on the subject were appeals for justice to India, regardless that it involved injustice to Clerkenwell and the silver manufacturers of this country. He did not attribute the falling-off in the trade to the operation of the duty, but rather to the altered taste of the public and to the circumstances of the time. People moved about now more than they used to do, and for that reason were more unwilling to have the risk and trouble involved in having a large amount of silver in their houses, which would have to be sent to their bankers every time they moved. They had been told of the debt which England owed to India; but he could not see how that justified a proposal that India should be repaid by the silver plate manufacturers of London and other places in this country who owed nothing to India. He thought that such a proposal was wanting in common honesty. The English manufacturers would still have to pay their license duties, and he claimed justice for those who had paid their money on the face of the present law. All through the debate the English manufacturers had been lost sight of. He was not asking for any protection, but he asked that there should not be spoliation. As to the question of the American manufacturers, the real question of their being able to do such a large amount of business was the existence of considerable protective duties.

Mr **Courtney** thought that he was to some considerable extent justified in saying that the Government had promised its adherence to the main object expressed in the resolution. They had, however, been told that the trade in gold and silver plate was declining, and that that decline was due to those duties. He was not at all sure that it was due to the duties; he thought that there were other causes. Under the present duties trade had increased for a considerable period, until the time when electro-plating came into use. Another reason which affected the trade was the change in taste which had taken place. The Government had more than once expressed a desire of getting rid of these duties, which undoubtedly operated to the prejudice of trade between India and this country. He might say that the Government desired to abolish the duties as soon as possible, but it was not an easy matter when the amount to be taken away was considered. If the duty were abolished it would be difficult not to make an allowance of drawback to those dealers who had stock in hand. With reference to the hall-marking of Indian plate, the hon. and learned member for Chatham had spoken of the law as it stood up to a recent date. It was said that a great deal of Indian work was so delicate and fragile that the application of the hall-mark was likely to interfere with the design of such work. That was a matter worthy of consideration, because they might decline to enforce the application of the hall-mark without taking away the liability to pay customs duty. He could assure the hon. member for Manchester that if the Government could see their way to remove the practical difficulties with reference to the drawback and the loss to the revenue they would be ready to abolish the duty. (Hear, hear.)

Mr **Muntz** said they had had from the Secretary to the Treasury one of those speeches which evidently meant nothing—a sort of speech to which he had been used for many years; and when he remembered that it was five years since the Committee sat, and when he remembered that they worked hard and reported unanimously in favour of the change now proposed, he could not help regretting that nothing had been done. If a Committee was to sit and report unanimously and nothing was to be done upon that report, he could not see any use in the appointment of a Committee. (Hear, hear.) This matter had become very serious. It was very easy for the Secretary to the Treasury to say they would do something when they had the money; but in the meantime the trade was going. (Hear, hear.) The reason assigned for the great increase in American manufactures was the heavy duty they put upon goods manufactured in this country. But it was not America we were superseded by; we were superseded in our own colonies—(Hear, hear)—and the great reason why American manufactures had increased was that she had by degrees learnt to manufacture everything, and was now taking our best workmen to work in the United States and supply our colonies. (Hear, hear.) The present tax was enormous, being no less than 1s. 6d. in 4s. 2d., and there was no tax in America to equal it. With regard to the hall-marking, he thought it would be very useful if it were not compulsory. (Hear, hear.)

Mr. **Salt** had personally no interest in maintaining the tax upon plate; but with regard to the hall-marking, which was not quite so easy a matter, he would be quite content with the suggestion made by the hon. member for Birmingham—that the public would be very well treated if they had the option to purchase plate with or without the hall-mark. (Hear, hear.) India had been most prominently mentioned in the discussion. That was a country in which, no doubt, this country had more interest than any other, and India objected to the present system, both on the ground that it hindered the importation of plate manufactured in India and also on the ground of the hall-mark. He had the very warmest sympathy for India, more especially so because he thought that all the parts of the empire ought, as far as possible, to be treated as one. (Hear, hear.) Finally, there was the position of the Chancellor of the Exchequer to be considered. He had three difficulties to contend with: there was the question of the hall-mark, the question whether he could afford to part with the tax, and also the question of the drawback. With regard to the portion of the trade which advocated this change, he believed it to be by no means suing *in formâ pauperis*, and therefore there were no grounds for the change on that score. It was a matter which, in his opinion, was not to be settled by a discussion in the House at large, but by the calm and quiet consideration of the Chancellor of the Exchequer; and if he could arrive at any decision which would be to the advantage of the public in this country and in India he would have his warmest sympathy.—*The Times.*

The Worthies of Horology.

By C. Stuart Murray.

XXI.

THE CLOCKMAKERS' COMPANY.

Eighth and Concluding Part.

ONE of the most inconsistent and curious anomalies of the law at the time of which I am writing was, that, although watches and clocks and their cases bearing the names of English makers, and imitations of the marks impressed upon those of native manufacture, could be openly sold without let or hindrance upon payment of the duty at the Custom House, or warehoused; yet, such a fraudulent practice could not be carried on in this country. The 53rd Clause of the "Act for the general Regulation of the Customs" of 1825, being the 6th of George IV. cap. 107, laid it down that the warehousing was an "exemption," and such goods have not to be re-exported. Think of that, ye ingenious timekeeping makers of this blessed, drowsy, dismal trade year of 1884. It must be mentioned that the duty on watch-cases made here ceased in 1798, by the 38th of Geo. III., c. 24, but continued upon those imported. The duty upon gold had been fixed in the previous year at 8s. an ounce, and upon silver at 1s. an ounce. The trade in England felt the over-weighted competition to which it was subjected in 1827, two years after the passing of the Warehousing Act, as it was called, very keenly. In fact it was made plain that an English manufacturer could go abroad, make watches and clocks, put what name he chose upon them, send them over to London, pay the duty, and sell them just as they were; or he could have all that done for him and clear them here in his own name without any questions being asked to disturb his temper. But, if he made them here, and "christened" them in the same way, he had to look out for heavy penalties! It is known that all the old cases were made double, and on that very account the plural term of "cases" was applied, and rightly applied to them; the name is used even at the present day, when all the parts are united. It was also the fashion for watchmakers to have circular labels with name and address printed upon them to fit into the cover of the outer case, one of which labels was always put in by the latest man who had worked upon the watch. All old watchmakers who may be now gliding about under the moon can very well remember these labels; often three or four of them in one case, and the dates when the several cleanings took place written upon most of them. Indeed I have known the owner of such watches cherish the labels of his watchmaker on the ground that "he was a good workman, an excellent companion, and on our monthly nights at the 'Wig-Wag' he could sing a capital song. But he has been dead and gone, poor fellow, for several years, and as long as I keep this watch so long will his ticket be inside of it. It has never gone right since he died, and although it has been 'mucked out' two or three times since, it does not seem to answer. You see, he understood its constitution, and what is more, *it understood him;* and there lay the secret." (!) And thus was explained the isochronal sympathy between the old verge movement and its "mucker out"—I beg pardon, its cleaner—the man who succeeded was the mucker out.

Passing along in this historical sketch, I find a name, one Eardley Norton, in the trade, which name was used by the smuggler for the sale of his contraband wares. A parcel of silver watches was seized one day at the Custom House, the cases being stamped with imitation Hall marks, and the above name engraved upon them. Here comes what may be called the "stupid" anomaly in the working of the law that has been already referred to. The watches were not seized on account of the forged Hall marks, but because they were entered for duty at the supposed under value of five shillings each! At the following Custom House sale, a Mr. Owen, of Wallingford, bought twenty-three of them at nine shillings each. When he had got them home, he found that, like the razors of domestic history, they were made to sell—that is, to sell both themselves and the deluded buyer. Now, had those watches been made in any part of Great Britain, the maker would have been liable to double punishment: firstly, to the civil law for using the name of an English maker, and secondly to the criminal law for having forged the Hall marks. As it was, the importer could only be dealt with for entering an under-valuation! Not many months afterwards another parcel, consisting of thirty-six silver and eighteen metal watches, all marked in a similar manner, and bearing the names of well-known London and English makers, were imported, entered for duty, cleared at the Custom House, and sold to the public, without any single maker whose name had been so flagrantly forged being able to lay a finger upon them! Here was an abuse that called aloud for a remedy. Were it not that my authority for it rests upon official documents, I could scarcely believe it as possible so late as five-and-fifty years ago.

The next step onward was in 1828, when Mr. Alderman Thompson sent to the Company a printed copy of a Bill for the better regulation of the Customs, which Bill was then in progress through the House of Commons, the Alderman being at that time one of the members for the City of London. The Bill was converted into an Act of Parliament in the Session of that year, and the 4th clause of it was the prohibition for which the Company had so long contended. It runs as follows:—

> "IV. And whereas it is expedient to prohibit the importation of Clocks and Watches having false marks or names thereon; be it therefore enacted, That it shall not be lawful to import any Clock, nor any Watch, impressed with any mark or stamp appearing to be or to represent any legal British assay mark or stamp, or purporting by any mark or appearance to be of the manufacture of the United Kingdom, or not having the name and place of abode of some Foreign Maker abroad visible on the frame, and also on the face, or not being in a complete state, with all the parts properly fixed in the case; and that such prohibition shall be complied with and enforced in like manner as if the same were set forth in a certain Table, denominated 'A Table of Prohibitions and Restrictions Inwards,' contained in the said Act for the general Regulation of the Customs."

Copies of this Act were sent to both the French and Swiss Consuls, and communicated by them to their respective governments. The practice of sending the watches named was for a while abandoned, but in the following year an attempt was made to revive it. The Company, however, were very much on the alert, and made the Commissioners of the Treasury acquainted with the arrival of the new venture. The result was that orders were given to have the watches seized and destroyed, which was accordingly done.

The Right Honorable William Pitt, the "Heaven-born Minister," as he was styled by his enthusiastic admirers, was a warm friend towards the British clock and watch maker. I do not remember whether I have previously mentioned the fact or not, but it was he who imposed the *ad valorem* duty of 75 per cent. upon all foreign clocks and watches imported into this country; this was the popular "Countervailing Duty," which I have at some time alluded to in these papers. And the British clock and watch maker reciprocated the friendship, as will be seen upon reading a few particulars about him which may very appropriately come in here.

William Pitt was the son of William Pitt, Earl of Chatham. I mention the two names because nothing is more usual than for persons to speak of "the great Pitt," very often meaning two different men, not knowing that there have been two "great Pitts," according to the judgment of the admirers of each. *Our* Pitt was born in May, 1759, and, wonderful to say, became Prime Minister of England at the somewhat youthful age of twenty-four! He remained in office until 1801, rested himself for a few years upon the soft seat of Opposition, but returned to power in 1804, and died as Minister in 1806. Upon his commencement of political life he was returned for the now disfranchised borough of Appleby by the influence of the then Sir James Lowther of Westmoreland.

Although Appleby is an ancient market town, dating from before the Conquest, and has a corporation consisting of a mayor, twelve aldermen, sixteen common councilmen, and other officers, it was not strong enough, with the whole of the Lowther interest to boot, to prevent its extinguishment by the Reform Act of 1832. Sir James returned nine members to the House of Commons, and his way of "doing business" was an example of "straight to the point" that could not be practised very well nowadays. If he was in London and a by-election was going on among the nine, he simply sent one of his decrees to the agent for that district, saying that Mr. Doggy was going down to be elected as member; the agent informed the tenantry; Mr. Doggy went down and was elected accordingly. Now, a man who could by the word of his mouth send nine members to the House of Commons was not to be snuffled at by any Ministry, and so William Pitt was made M.P. for Appleby. He returned the compliment before long, and created Sir James Lowther Earl of Lonsdale. Such was the entrance of the "heaven-born" statesman into parliamentary life. In 1784 he was elected for Cambridge University, and as member for that constituency he remained until his death in 1806. He was buried in Westminster Abbey, by the side of his great rival, Fox, in the north transept; and there is a monument to him by Westmacott over the western entrance of the nave. His death took place at Putney; and, although he had been Prime Minister, he was hopolessly insolvent. But a grateful nation came to the rescue—of his creditors and his remains. He was honoured with a public funeral, and Parliament voted the handsome sum of £40,000 to pay his debts! There is a monument to his memory in Guildhall, London; and a statue in bronze in Hanover-square, by Sir Francis Chantrey, that cost £7,000. It is not, perhaps, so generally known that it was William Pitt who laid the "foundation stone" of the West India Docks in July, 1800.

As member for the University of Cambridge the idolised statesman was on the roll of a long line of illustrious predecessors, to us the chief amongst them being the famous Sir Isaac Newton. Mr. Pitt "took" to the Clockmakers' Company; and there is very little doubt but that the Clockmakers' Company "took" to him. At the general election of 1784—just a hundred years ago—he was proposed by the Livery and placed in nomination to represent the City of London. There is no difficulty in "reading between the lines," to comprehend the hand of the Clockmakers' Company here. The "Cambridge man," as member for the City, would have come into personal contact with the guilds, and the Clockmakers would not have sat below the salt upon grand occasions. But it was not to be; and I have unearthed from a heap of my forgotten political lore the following letter which was sent in response to the electoral invitation:—

"*To the Livery of the City of London,*

"Gentlemen,—

"I have just learnt that I have this day been proposed, in a manner equally unexpected and flattering to me, as a candidate to represent the City of London in Parliament; and that I had the honour of having my name returned on the show of hands. It is impossible for me not to feel the warmest gratitude and satisfaction in receiving so distinguished a mark of confidence from so great and respectable a body. It is the more honourable to me, as I can attribute it only to their approbation of my public principle and conduct in the present important moment. Sensible as I am, at the same time, that my engagements are not sufficiently compatible with the duties incumbent on one who has the honour of being placed in that situation, I should be wanting in respect and attention to the City of London if I did not take the earliest opportunity of begging to decline the poll. Permit me to add, that I trust I shall on no occasion be found less zealous to promote the interests of the City, and with it those of the kingdom in general, than if I had the honour of being sent as their immediate representative.

"I have the honour to be,
"Gentlemen,
"Your most obedient and faithful, humble Servant,
"W. Pitt.

"Downing-street, March 30, 1784."

I have mentioned these few particulars about William Pitt in order to show the reader his tendency towards protection in trade matters, and also the estimation in which he was held by the Livery of London. It was greatly regretted at the time that he did not go to to the poll, as his election was discounted as a foregone conclusion, whilst his influence would have been very valuable on the side of City interests.

As the duty of 75 per cent. upon foreign clocks and watches was thought to offer too tempting a profit upon smuggling, it had been reduced to 25 per cent. at one operation. But smuggling decreased very little in consequence, and the Company were again in motion citing Mr. Pitt's action in relation to his commercial treaty with France. What was now being complained of was, that the Customs officers were too lax in the matter, and accordingly a very strongly worded memorial was sent in to the Lords of the Treasury, embodying further stringent remedies. It was proposed that the import duty upon foreign clocks and watches should be made to assimilate to the relative situation of the working classes in this country and in France and Switzerland; that the collection of the duty be rigidly enforced, and that all imports have a duty-mark stamped upon them at the date of payment. That no unfinished work, either in instruments or cases, be permitted to be passed, and that complete instruments, to be eligible for passing, have both the name of the maker and the places where made engraved upon them, and that no partially made clocks or watches or materials, including steel pinion wire, or pendulum-spring wire, be exported from this country, and that strong enactments be brought to bear upon the home wholesale smuggler who furnishes the capital, to compel him to retire from the illicit trade. An answer, however, came from the Treasury, saying, that "*it does not appear to my Lords that any attempt to relieve you from foreign competition by rigid Custom House regulations would have a beneficial effect in protecting your trade.*" The Treasury would not listen to the proposal to have foreign watches seized that had not paid the duty, if such watches had been smuggled through the

Custom House. The power of search in shops and other places was also urged; but the Treasury would not listen to the suggestion, upon the ground that it could never be properly carried out, and the facility of counterfeiting the proposed marks by the smuggler was also given as another reason why the Government should allow things to remain as they were.

The Company, however, were not to be "cornered" so easily. Mr. George Atkins, the clerk, who ably carried on all the correspondence, very completely dealt with the objections against seizure, and also about the facility with which any duty marks could be counterfeited. He gave the Company's indisputable answer, that the very considerable revenue derived from the duty upon gold and silver in this country was entirely secured by the marks which were impressed upon the several articles manufactured; that all such articles were obliged to be sent to the legal offices where the duty was paid, and the duty marks stamped upon them before they dared to offered for sale, any breach of the law in that respect bringing down severe and heavy penalties upon the heads of the offenders; so much was that the case, that very few instances were known of the law being evaded. With special reference to the right of search and seizure, it was justly maintained that British subjects who dealt in wine, spirits, tobacco, etc., etc., were under all such inconveniences, and, therefore, why not foreigners? Why should so much vigilance be exercised towards British-born traders, and foreigners be exempt from it? In Paris, it was contended, watches were marked with the quality of the gold in the cases, and, therefore, why not *all* watches that are for sale in London? Furthermore, English watchmakers had always been obliged to take out an annual licence to sell gold and silver, and why not traders from other countries? The conclusion that was drawn by the Company was, that the imported articles being almost entirely used by *the upper classes of society*, it was not expedient to press with any rigour upon them. Such being the case, it was affirmed that both the revenue and the interests of the British manufacturer and the working classes were sacrificed for the pecuniary advantage of the higher classes. The working classes in the watch and clock trades were said to be "feeling alive" to such one-sided conditions; that while they were heavily taxed they were at the same time deprived of the means of earning the money to keep themselves and families and pay the weighty taxation that pressed upon them.

That statement produced a reply from the Treasury to the effect that a General Order had been issued to the Customs officers all over the country, enjoining them to devote their utmost vigilance to the prevention of the illegal importation of watches and clocks, or their admission at an improper valuation. The Company having "turned the tables" upon the Treasury and Customs officials, the matter went before the House of Commons, supporting all the Clockmakers' statements, and ultimately the Government messengers were said to have been implicated.

The Company obtained the passing of an Act in the Parliamentary Session of 1833, which practically granted them all that they had been long contending for. By that Act all foreign clocks and watches, or parts of them, were bound to have the maker's name and place of manufacture impressed upon them, or *not to be landed at all.*

This having finished the stormy and agitated period of the Company on behalf of the trade, I cannot do better than take my leave of the subject at this point, the interest being now ended.

◆

Pictures without Light.

(From the "American Horological Journal.")

WHEN new watches, which are engraved on the cap, have lain for any length of time, it will often be found, on opening them, that the engraving on the cap has been transferred to the polished inside of the case. Nearly every dealer and workman must have observed this effect, which is worthy of more than a passing notice, as there are apparently no causes that can produce it.

We are all familiar with the Daguerreotype; but as we find certain causes alone will produce a picture, we assign the phenomenon to those causes. Thus, when a plate of silver is properly polished with a perfectly clean surface, we may render it sensitive by means of iodine, and take a picture by means of sunlight. We attribute the effect to the action of light, but can go no farther; for if we decompose a ray of sunlight, we shall have what is called the solar spectrum; now it has been found that this peculiar action on the sensitive plate is not equal for any two parts of the spectrum.

The various colours that are exhibited in the spectrum act with very different degrees of energy and with very different kinds of effect. Though all bodies are affected by light, those of weak chemical affinity are attacked and changed with the greatest rapidity; and when we use the word light it must be understood that we mean solar. Yet, while such changes are effected by solar light, it is possible to effect the same results when no visible light is present; that is, the plate may be impressed with an image in the dark. As the action is due to purely chemical changes, Sir John Herschell, on reasoning on the inequality of action in the different parts of the spectrum, came to the conclusion that, combined with its illuminating power, light possessed properties capable of exciting chemical action. This discovery—for such it was—has since been confirmed by thousands who have taken Daguerreotypes. The chemical ray thus found is the active cause of all the changes that occur, in all the changes that are wrought throughout the various processes of photography. A certain degree of chemical action, as stated before, is distributed throughout the solar spectrum, though exhibited with different degrees of force and kind. This distribution does not depend on the refrangibility of the rays alone, for it seems that the length of the chemical spectrum varies with the nature of the surface on which it falls. If received on paper prepared with bromide of silver, the paper will be blackened; and this chemical change is found to extend far beyond the extreme violet, while it commences at the extreme red. With tartrate of silver the blackened part extends beyond the extreme red, and the formo-benzoate of silver gives the chemical spectrum cut off at the orange rays; with chloride of gold it ends at the blue; and the nitrate of silver places the blackened part entirely beyond the visible spectrum, at the end of the highest refrangibility, but is only one-half its length. From these facts it will be seen that in the case of nitrate of silver the picture can be taken in the dark; for the luminous spectrum may be cut off, and the chemical only used.

The kind of action is not the same at the ends of the chemical spectrum, nor indeed anywhere within the limit of of the visible spectrum—the different colours having a strong tendency to reproduce themselves; but the most wonderful about it all is, that while at and beyond the extreme violet the chemical ray produces the most intense black, the rays emanating from the red have a tendency to bleach the image already formed.

Now, very similar effects may be produced by electricity, and, as at the present day, light (or at least its chemical agent, electricity) and heat are considered one and the same force, differently manifested, we are led to think that heat, too, has its chemical rays, and that, like light, it may produce pictures, The fact has been established beyond doubt that the calorific and parathermic rays act in precisely the same manner on surfaces rendered sensitive by chemical preparations or an extremely high polish. Prof. Moser, of Königsberg, has proved that "the mere contact of two bodies, or even their juxtaposition, will produce the same effect as the action of light, and this change of surface, by contact, could be produced in the dark as well as in light. His announcement of the discovery, contained in the following quotation, will give our readers some idea of how, when he happens to touch the inside of a highly polished case, the marks, though not instantly, will appear, and are troublesome to be got rid of. If a surface has been touched in any particular part by anybody, it acquires the property of precipitating all vapours, and these adhere to it, or combine chemically with it, on those spots differently to what they do on the untouched part." Every one of our readers undoubtedly has, at some time, written on a window-pane on which the moisture of the atmosphere has been condensed; if he tried by his breath, to recondense some vapour on the written part, he found that the vapour would not condense. The converse of this experiment is to write or mark with any substance on a surface highly polished (a piece of blotting-paper rolled to a point, or a clean brush, is the best): we may clean the plate or surface, and no marks appear; but if we breathe on the plate, the writing is apparent. The highly polished surface of mercury is a fine one with which to try the experiment. But absolute contact is not necessary; for if we cut any piece of cardboard through with some well-defined pattern, and hold it over a polished surface at a small distance, and then breathe upon the card and surface, we shall find that, after the vapour has thoroughly evaporated, we may reproduce the pattern by simply breathing on the plate.

Prof. Moser has shown that bodies exert a strong influence on each other by the following experiments:—He chose a warm metallic plate, and for a short time allowed coins and various articles to rest on its surface; on removal the surface presented the same appearance as it did before, but images of the various articles came out distinctly when the plate was breathed on, or exposed to the vapour of mercury." This was not all: he next chose a plate of glass, and the result was the same, even when the bodies were not in contact; and it made no difference as to success whether the experiment was performed in light or darkness.

It would seem, however, that in addition to heat, galvanism plays a peculiar part, for Mr. Hunt has shown that in order to get good impressions the coin should be of a different metal from that of the plate. His experiment consisted in placing on a plate of copper, heated far below the oxidization point, several coins of different metals, such as gold, silver, composition of copper and tin, brass and copper. These were kept on the plate until all were cold, when it was found that all had left their images impressed on the plate, but not with equal distinctness or intensity. The gold and silver were nearly equal, the bronze next, and the similar metal last. He next exposed the plate to the vapour of mercury, and the impressions were in the same order. He next wiped the plate off, and the gold and silver coins had left permanent copies of themselves on the plate. The same results were attained when the coins were raised as much as an eighth of an inch from the plate. The relative sizes of the object seemed to have an influence; for the larger the coin, the better the impression.

The experimenter availed himself of this property of the metals to copy engravings and prints by the use of an amalgamated copper plate; on this the print to be copied was laid and closely pressed by a thick plate of glass, the whole was then laid aside for a few hours; when the parts were separated the copper face was exposed to mercurial vapour, and then to that of iodine, and an accurate impression of the original was obtained. Mr. Hunt was led to this result from having found that he got stronger impressions from black substances than any other; hence an engraving was peculiarly fitted for the experiment.

We have stated that electricity would produce this change in surface, and this fact is strong presumptive evidence of the identity of forces which are commonly called by three different names. Mr. Karsten obtained the same images on the surface of a glass plate, resting on one of metal. The coin was placed on the glass, and subjected to a series of electrical discharges from a Leyden jar. When the glass was subjected to vapour of either mercury or iodine, the image was brought out with perfect distinctness. More singular still, if several glass plates were piled together and arranged as the single one had been, after the electrical discharges each plate had the image firmly impressed on its upper surface.

Any disturbance of the calorific rays will produce the same results; for if the copper plate was reduced in temperature by means of a freezing mixture, and bad conductors of heat laid upon it, under the same conditions the results were identical. Now, all this goes to prove that, the absolute amount of latent heat being disturbed, the molecular change of surface takes place; and we have reason to believe that a change in the molecular condition of the whole mass is produced, for on wiping off or cleaning a plate on which the images have been impressed, the shock of a discharge from the Leyden jar will reproduce them. M. Matteuci, whose experiments and reasoning on the whole range of galvanic and molecular changes have placed him in the highest rank as an authority, has proved that an electrical discharge does not visibly affect a polished silver plate; but that the surface was so altered as to affect the condensation of vapour.

Now, in all these experiments of Mr. Hunt we cannot see the cause of action; but we can reason that bodies in close position do exert a reciprocal action, and he made an experi-which was attended with more singular results than those attending the former observations. He placed an engraving with its face side on an iodized silver plate, placing over it an amalgamated copper plate; after the whole had been left in total darkness for some hours, he found, on submitting the copper plate to the action of mercurial vapour, that the picture had actually appeared, and it must have been through the paper that the impression was obtained. Again, he iodized a silver plate and placed a small coil of string on it, then suspended another plate (clean) above, at a distance of about one-eighth of an inch; after four hours' exposure both plates were submitted to the action of the mercury, and the upper plate alone had a perfect image, while the iodized plate showed no trace. We must conclude from this experiment that surfaces may be altered by some cause in the dark; and we may attribute it, with good reason, to the chemical rays of heat, for the action is precisely analogous to that exercised by the chemical (actinic) rays of light.

From all the facts stated, we are warranted in assuming that the same conditions are fulfilled in the watch-case; and it must have struck the mind of any one who has been observed the fact, that those domes or capes that are engraved with broad letters, matted at the bottom, are the most commonly transferred. We can, then, form the theory that the engraving has, by simple juxtaposition as in Mr. Hunt's experiments, transferred itself to the unengraved case.

Japanese Clocks.

(*From the "Journal Suisse d'Horlogerie."*)

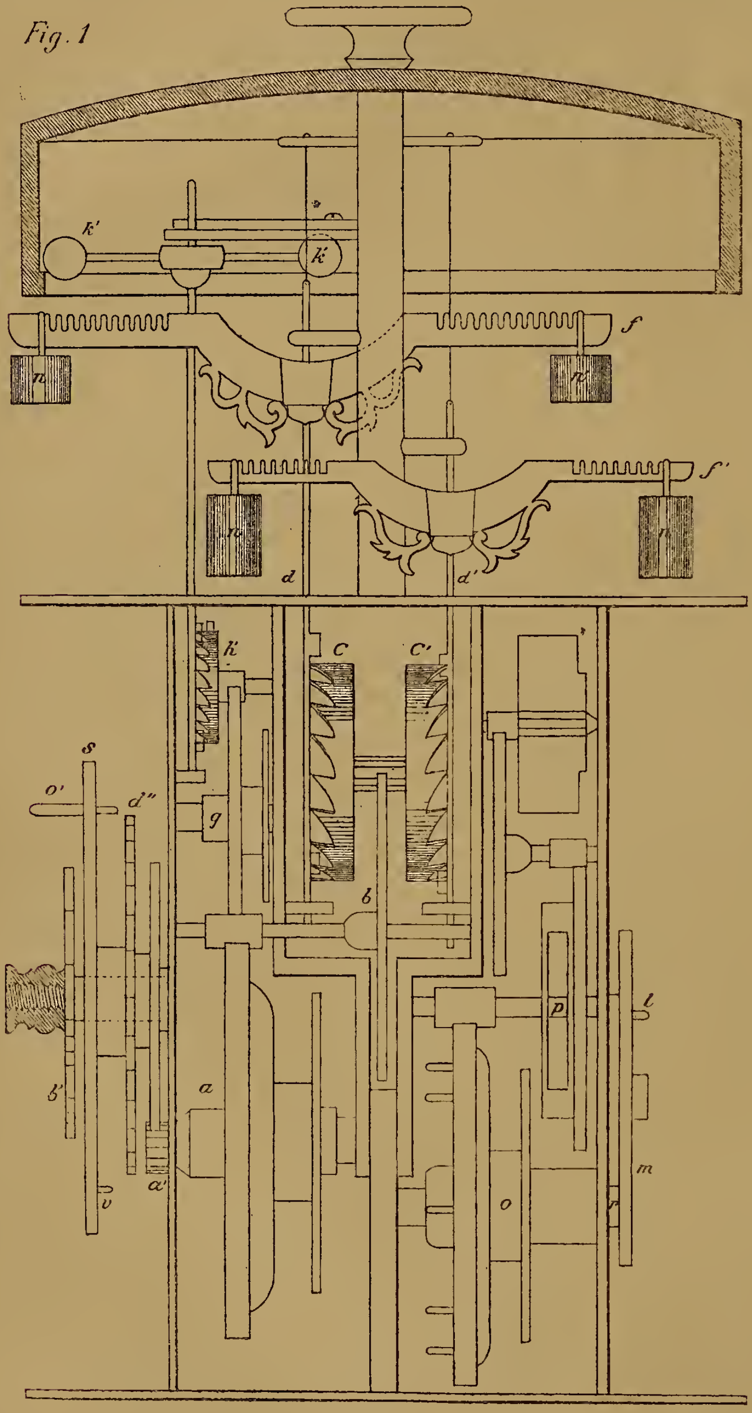
The Japanese, the same as many Oriental people, measure time according to the position that the sun occupies in the firmament; they divide the day into twelve hours,—namely, six for the day and six for the night. The six hours of the day commence with the rising and finish with the setting of the sun.

As the latitude of Japan is nearly the same as that of our regions, it will be understood that the duration of the hours of this country are variable, and that in summer, for example, those of the day are sensibly longer than those of the night, or than the same hours of the day during the winter. It therefore results that, to conform to these exigencies, the horological instruments ought to be combined in such a manner that the day and night may be exactly divided in six equal parts, whatever may be their duration.

To solve this problem, the Japanese have conceived many very ingenious systems which it seems useful to us to bring before the knowledge of our readers. Perhaps some of our able artists will be much astonished to find combinations that they would have thought the Western mind alone able to realise.

The clocks of which we give the description are the pro-

Fig. 1



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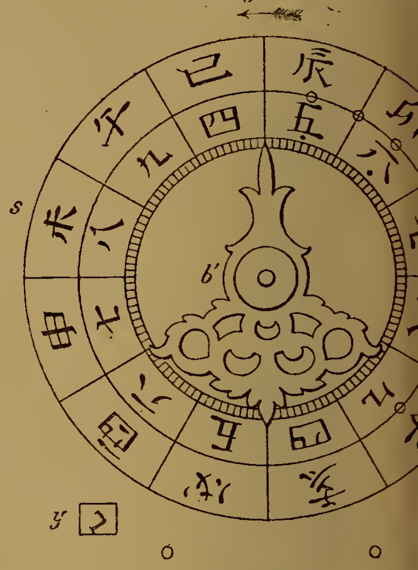
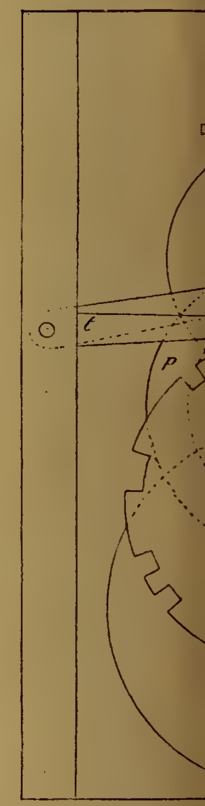


Fig. 2.



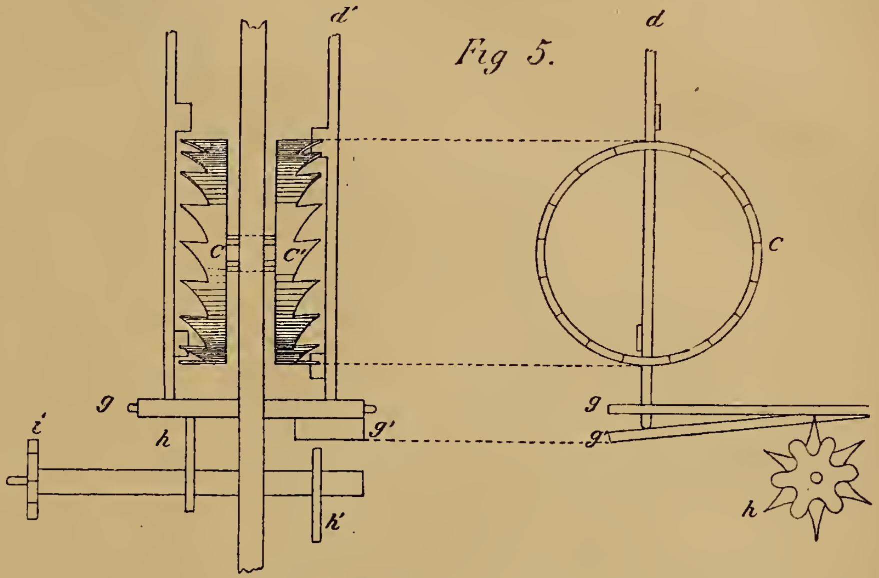
perty of M. Favre Perret, and are of three distinct types, as follows :—

1. Those in which the hours are placed in a perpendicular line, and in which the intervals are regulated *by hand*, the hour being indicated by a movable hand.*

2. Those in which, the hand being fixed, the hours are disposed round a dial turning with a *variable* speed according to the seasons.

3. Those in which the hand being fixed, and the dial movable, the hours disposed round the latter can lengthen or shorten themselves automatically.

The clock which forms the subject of the illustrations, which have been reproduced for this Journal, belongs to the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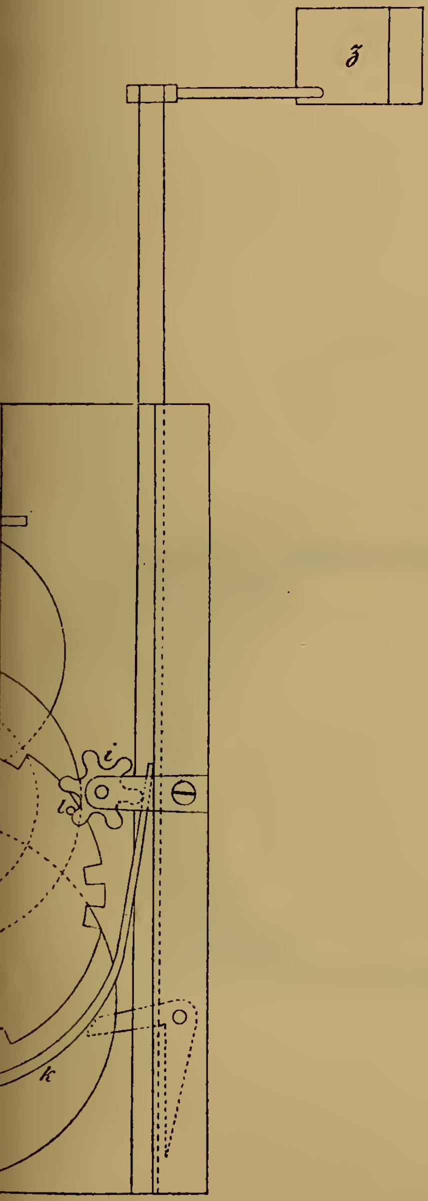

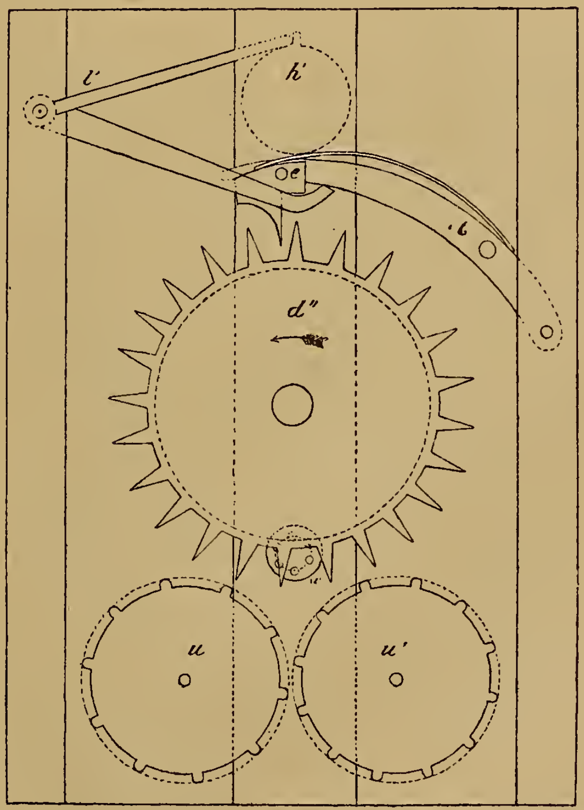
Fig. 3.

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* [The clocks of the first type have a balance and spring with a verge escapement, and somewhat resemble in appearance an old-fashioned eight-day clock, with the dial and hands removed. Imagine such a clock minus the pendulum, and having the figures delineated on the glass door of the case, so that the weight itself constitutes the hand. Imagine also that at each hour and half-hour it sets a striking arrangement into motion by passing a set of yielding levers, and the idea is fairly complete. Lovers of fine work will regret to hear that the wheels are not crossed to the Japanese clock we are endeavouring to describe, neither are the pivots polished; but the ingenuity displayed in its construction is really marvellous. The "weight" is another clock, containing the striking-apparatus, with bell, hammer, counting-wheel, etc., complete. An ornamental hand is fixed to this, which indicates the hours as it descends; and the striking is put into action by coming into contact with pins, which have to be re-arranged according to the time of the year.—Ed. *W., J. & S.*]

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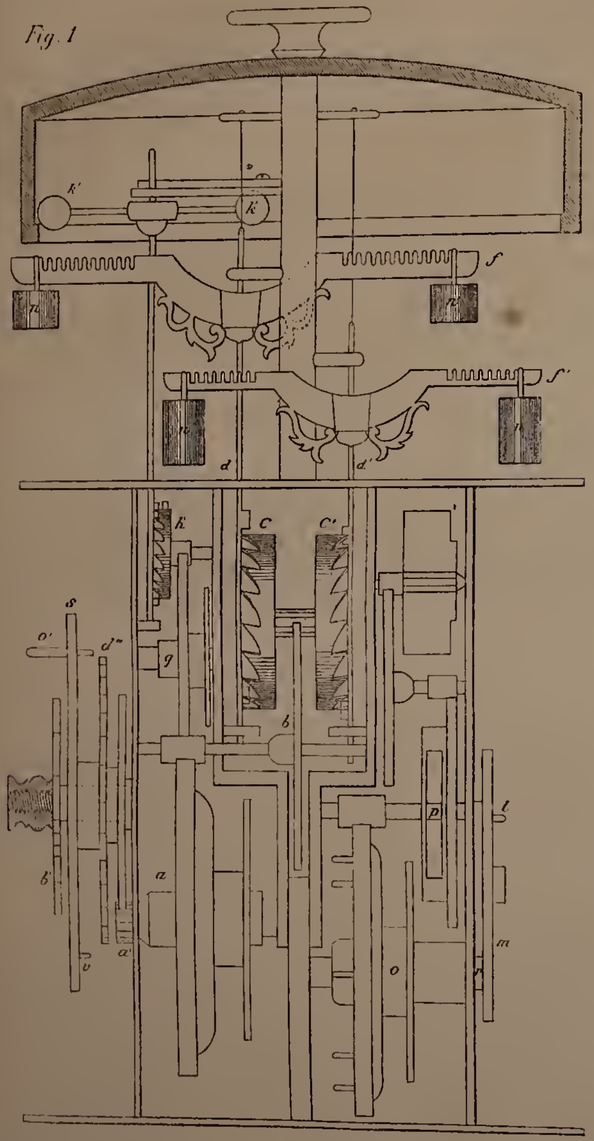

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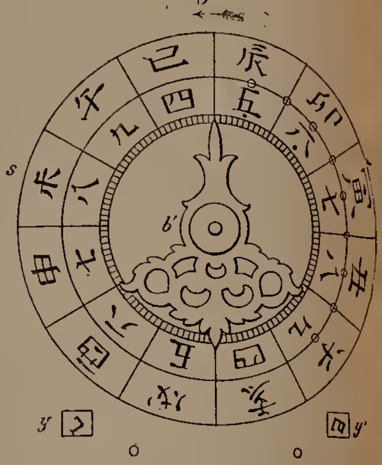
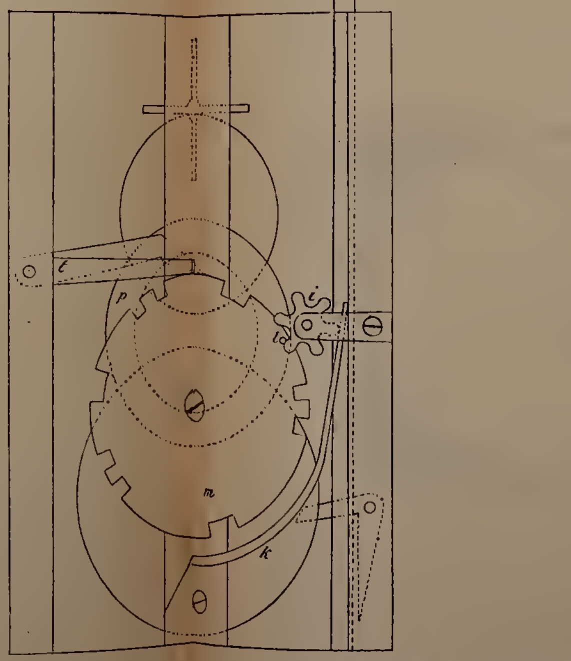


Fig. 2



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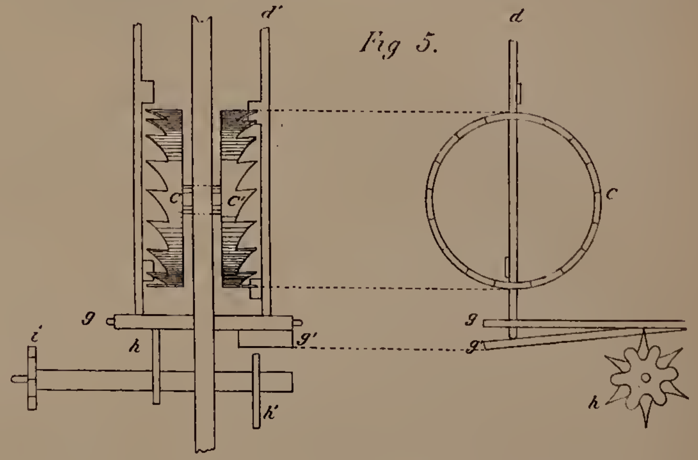

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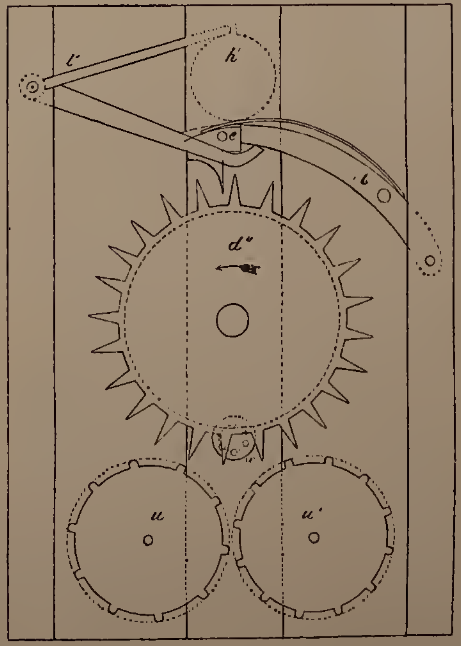

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second type, and is thus explained in the *Journal Suisse d'Horlogerie* :—

"This clock is moved by weights. It contains three trains of wheels—for the hours, the striking, and the alarm. The hour train is composed of a barrel wheel *a* (fig. 1) which receives the cord, of a second wheel *b*, and of two escape wheels *c c'*, rivetted on the same pinion. The numbers of this train are as follows :—

Barrel	84	
1st wheel	72	6
Escape wheel	17	6

"The barrel wheel carries a pinion of six leaves *a'* which drives a wheel of 72, which carries the dial *s* pivoting on a rod, on which is fixed the hand *b'* (fig. 4).

"To obtain the different duration of the hours of the day and night, the two escape-wheels have each their verge, *d d'*, one of which carries a long arm, *f*, the other a shorter arm, *f'*, each of these verges is alternately in action. To produce this action, the verge which ought not to act is lifted vertically ; this movement is obtained by means of two levers, *g g'* (fig. 5), which receive the movement of two triangular stars, *h h'*, fixed on the same axis, but so as to cross each other. On this axis is also placed a six-toothed wheel, *i* (fig. 2), yielding to the action of a jumping-spring, *k*. All this system is moved by the pin, *l*, carried by the counting-wheel, *m*, of the striking train, and it is at the moment that the six strokes sound that the star jumps, and, in consequence, that the arms, *f f'* (*foliots*), reverse their positions. These six strokes correspond to the rising and setting of the sun. The arms carry some small weights, *n n'*, which it is necessary to arrange according to the epoch, in order to conform to the duration of the day and night.

"The striking is remarkable for its simplicity. A barrel wheel (figs. 1 and 2) carrying a pinion, *r*, transmits the movement to the counting wheel, *m*, also to a wheel carrying a notched disc, *p*, on which acts the lever (*couteau compteur*) *t*. When this last meets a low part of the counting wheel, it falls in the notch of the disc *p* and the train is stopped. This train is terminated by a third wheel and a fly. The pins carried by the wheel *o* transmit the movement, as in an ordinary clock, to the rod of the hammer *z*.

"The dial *s*, the movement of which is effected from right to left, carries on its axis a star of 24, *d''* (fig. 3), which serves to lift up the lever *t*, and in consequence to disengage the striking ; it disengages it twenty-four times a day for the hours and half-hours. The nose *e* of the lever *t* acts as a click, in order that the dial may be put back if necessary.

"The alarum is also extremely simple : a barrel wheel, *q*, (fig. 1), moved by a weight, gives the movement to an escape-wheel and pallets *h'* which act on a verge carrying a double hammer, *k' k'*, striking on the bell. The stopping of the alarum is effected by means of a pin just butting against the lever *l'*, which is lifted up to the hour wished, by a small rod, *o* (fig. 1), screwed on the dial. The holes made to receive it are shown in figure 4.

"The hour dial carries in addition a small pin, *v* (fig. 1), which acts on two wheels, *u' u'*, (fig. 3) ; this makes a tooth pass each day. These wheels, one of ten teeth and the other twelve, each carries a plate on which are engraved certain zodiacal signs of which one only is visible through the openings, *y*, *y'*."

This completes the description of the action of the mechanism and we shall revert to the subject on a future occasion.

(*To be continued.*)

Going Barrel Up and Down Work.

(*From the "Revue Chronométrique.*"

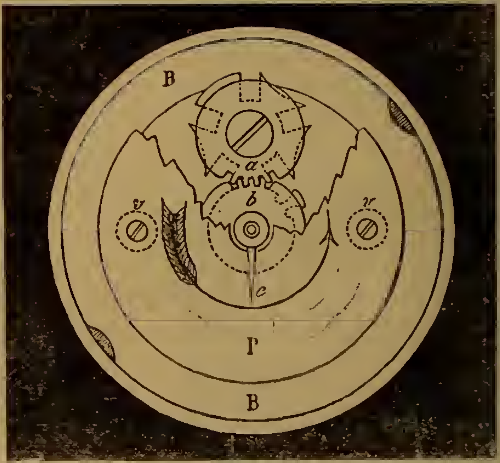
M. SAUNIER says :—"M. Amédée Vallet, of Bordeaux, one of our retired masters, has forwarded us a specimen of a new indicator of the development of a mainspring. It differs from that published by M. Barthet in the *Revue Chronométrique* (Pl. xxxviii., Vol. III.) above all in two points : 1st, it is more simple ; 2nd, it utilises the movement of the stop-work.

It was invented under tha following circumstances :—A captain of a ship, who possessed a fine-adjusted watch (*montre de précision*) with a going barrel, constantly doubted if he had wound it up. He applied to M. Vallet, and asked him if it was possible to adapt an indicator to his watch, showing at any moment the tension of the mainspring ; the reply was in the affirmative, and here is the combination which M. Vallet conceived :—

He adjusted an edge on the plate, in order to raise the dial ; this necessitated an alteration in the breadth of the band of the case, and the displacement of the pendant to put it in the centre. [We conclude that the watch was not keyless.] Besides this, an opening was made in the dial, and the barrel arbor lengthened.

These preliminaries being arranged, the following indicating system was adapted to the barrel :—

The cover *B B*, furnished with an ordinary stop-work (Maltese cross and stop-finger) carried on the cross, fixed to it and held by the same screw, a toothed wheel, *a*. Another wheel, *b*, geared in it, like a canon pinion. This wheel, *b*, turned freely on a pivot put into the barrel arbor, and had a light friction on the stop-finger.



Above the whole, a plate *v*, *P*, *v*, is fixed to the barrel, cover on two blocks, shown by the dots, by the screws *v*, *v* ; it is pierced in the centre to allow the pipe of the wheel *b* to pass through it. (This plate, which rests on the screw of the Maltese cross, is notched out, in order that the action of the pieces placed below may be understood.)

The arrow which indicates the design being traced on the plate *v P v*, and a hand, *c*, having been fitted to the pipe of the wheel *b*, it will be at once understood that when the watch is wound the hand *c* of the wheel *b* will come back towards the point of the arrow, and that when the axis has become immovable it is the barrel which turns, and by means of the Maltese cross, fixed to the wheel *a*, brings back the hand of *b* from the point of the arrow to the feathered part.

This returning movement is done by stages: the *first* ought to answer to the point of the dart; the *second*, to the base of its triangle; the *third*, to the middle of the smooth, curved rod of the arrow; the *fourth*, to the first feathers; the *fifth*, to the last (the spring is then nearly at the bottom); and at the *sixth* the hand *c* stops towards the extremity of that part of the wood of the arrow which projects beyond the feathers (*forgotten by the engraver*).

Is it necessary to explain that before engraving the arrow some lines or points ought to be traced on the plate *v P v*, to indicate the various stages of the action of the system?

[Before having the block engraved we made a practical test of the above contrivance, which is worthy of notice on account of its ingenuity, although, as it only indicates periods of five hours, its utility is open to be called into question. The greatest nicety is required in adjusting the friction, or *frottement* of the wheel or canon pinion which turns on the barrel arbor. If it is too tight, it will either stop or take the power off the watch, and, on the other hand, if too easy it will yield to the pressure of the wheel fixed on the star, so that the hand might make a complete revolution, with the barrel going round only once, instead of only moving a certain distance when the notches in the star are in gear with the finger-piece.—Ed. *W., J. & S.*]

The Balloon Society of Great Britain.

At the usual meeting of the members of this Society, held in the lecture hall of the Royal Aquarium, and presided over by Mr. E. J. Watherston, papers were read by Mr. R. Whittaker and Mr. Henry Ganney, on "The Causes of the Decline of the English Watch and Clock Trade." The chairman, in the course of his opening remarks, said that the great cause of the decline in the English watch trade was the failure of this country to take earlier practical steps to secure for artisans sound elementary and technical instruction. The idea of horological schools had prevailed upon the Continent for more than half a century. It was not surprising, therefore, that in Switzerland 37,969 persons, one-third of whom were women, were employed in making Swiss watches, and that the annual output exceeded a million and a half. France had also attained great results; and when England adopted similar means, like results might be expected. We were behindhand altogether in watchmaking machinery, the use of which was general in Geneva and America. It would therefore take English watchmakers ten years to place themselves in competition with the last-mentioned countries. Mr. Whittaker, in his exhaustive paper, said one of the principal causes that had led to the decay of the chronometer, watch, and clock trades in this country were the neglect of machine tools. This neglect was attributable, perhaps, to a dread that with the increase of watchmaking machinery there would be a decrease of hand labour. Such an idea was a great fallacy, as had been proved in other trades. Mr. H. Ganney observed that the workmen of the country constituted the skill of the country, and if not properly looked after those men went abroad, and with them departed the backbone of the trade; more especially had that been the case with the English watch trade. Mr. Moore moved, and Mr. Young seconded, "That while recognising the skill and ingenuity of English watchmakers, this meeting regrets that the laws and the customs of our country tend only to discourage their advancement in the path of progress, and respectfully urges the Press and public men to abolish all such obstacles." After some discussion the resolution was agreed to, and the meeting terminated.

Ancient Gems and Gem Engravings.

By James Prendeville.

(*Continued from page* 170.)

THERE were other combinations of this animal among the Egyptians, such as the ram-headed sphinx, the hawk-headed sphinx, which were only modifications of the same meaning;—the hawk being the symbol of vigilance and swift execution; the ram the sign of power and prosperity: horns were invariably the types of power and strength, and the fleece of the sheep was synonymous with wealth and comfort. The *Grecian* sphinx was a compound of a lion and a *female*; and the Greeks most probably meant to show by it *power* blended with *elegance, grace*, and the *attraction* of beauty.

Hieroglyphics were not single and detached emblems only; they often formed groups to convey some great moral lesson or religious tenet. Clemens of Alexandria mentions one engraven on one of the gates of the temple at Diospolis. "There appeared a *child* (the symbol of birth), and an *old man* (the symbol of death), a *hawk* (the accepted symbol of the Divinity), a *fish* (the symbol of hatred), and a *frightful crocodile* (the symbol of effrontery and insolence). All these united meant, 'O man, who art born, and who diest; God hateth the shameless and the insolent.'"

But the Egyptians were not the only people who used hieroglyphic symbols. Warburton shows that the Chinese, the Scythians, the Indians, and the Mexicans, used them. All readers of the invasions of America by the Spaniards must recollect how rapidly the intelligence of the first landing of the invaders in Mexico was transmitted to Montezeuma, the emperor by means of symbols or picture-writing. "The History and Antiquities of Mexico"* will show the perfection to which the Mexicans brought this art; and every classical scholar must recollect the symbolical representation (which is mentioned by Herodotus) sent by the Scythians to Darius, on his invasion of their country: it exhibited a bird, a mouse, a frog, and five arrows; thus intimating, that if he did not fly away as swiftly as a bird, or hide himself like a mouse or frog, he would perish by their arrows.

The claim to superior antiquity and of prior civilisation set up by the Egyptians, and long acknowledged, has been much shaken by modern discoveries; for the great similarity in customs, manners, and religion between them and the Hindoos and other Eastern nations, has been justly considered evidence of identity of origin. Now, the stream of population, and of civilisation too, has confessedly flowed from the East; and, as many of the oldest religious rites and customs, and specimens of the arts, among the Egyptians, are now proved to have been identical with those ascertained to have existed in Hindostan (some precious stones, for instance, have been discovered with Sanscrit inscriptions and devices coeval with, if not antecedent to, the earliest Egyptian relics),—an inference has been plausibly, if not justly, deduced, that the Egyptians borrowed, and perhaps improved the discovery of others.

But, without entering into a discussion of the relative claims of these nations to the merit of originality, let us concede the merit to the Egyptians. The form of government among the Egyptians had much influence on the cultivation of the fine arts in ancient Egypt. Although there has been much disputation about the most ancient form of settled government in that country, the balance of probabilities appears to incline to the theory that it was, like that of the Jews, a *hierarchy* or a priestly government. "From the circumstance," says Wilkinson, "of the earliest names enclosed in *ovals* (or *egg-shaped* engraved stones*) being preceded by the title of priest, instead of king, it is fair to infer that the priestly form of government preceded that of the kingly; and the account of Manetho and other writers, who mention the reign of the gods, would seem to sanction or even *require* such an inference." Yet we must not take this mention of the reign of the gods, in its strict and literal acceptation, to imply that there was a time when the Egyptian divinities ruled on earth, any more than we can suppose that Saturn in reality descended from heaven and governed Latium, but only take it to mean figuratively that the ministers of the gods—the priests—had absolute sway in the land—that the time of their government was a golden age of happiness, piety, and virtue. To this the character given by Cicero (*de Republ.* iii. 8) of the ancient Egyptians refers: "that *nation uncorrupt* (*gens incorrupta*) which contains literary memorials of countless ages and events."

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* The folio work in twelve volumes, compiled chiefly by the labour, and solely at the expense, of the late Lord Kingsborough, eldest son of the Earl of Kingston, of Michelstown Castle, in the county of Cork (the cost being £31,000). This noble contributor to the literature of the country, and the author of the most splendid book that ever issued from the Press of any nation, died, some years ago, in Dublin.

From Herodotus (lib. ii.) and from Plutarch (*de Is.*) we find that the priests and the inhabitants of the Thebaid did not believe that any Egyptian deity ever ruled on earth. The story, then, of Osiris's rule in this world was purely allegorical, and intimately connected with the most profound and curious mystery of their religion; and so great was the reverence of the priests for the important secret, and for the name of Osiris, that Herodotus scrupled to mention him (the Jews felt a somewhat similar awe to pronounce the name of Jehovah); and Plutarch says that the priests talked with great reserve even of his well-known character of ruler of the dead. The Egyptians ridiculed the Greeks for pretending to derive their origin from deities. They showed Hecatæus and Herodotus a series of three hundred and forty-five high-priests, each of whom, they observed, was "a man, the son of man," but in no instance the descendant of a god.

One great cause of the progress of the Egyptians in civilisation, power, and all their accompanying arts was the division of the people into castes, or classes (as among the Hindoos): such as the class of priests, who were exclusively confined to the pursuit of the theories and the practice of the rites of religion in its various departments; the soldiers; the artificers; the husbandmen, &c. As each class was confined to one pursuit (for instance, among the artificers the particular trade or occupation of the father was followed by the children, down through successive generations), a growing fund of knowledge and improvement was created, that tended to promote abstract science, mechanical dexterity, national wealth, prosperity, and comfort. But however great may have been the success of the Egyptians in many other departments of science and mechanism, especially of architecture, it was, generally speaking, much restrained in *engraving* by the stern and fixed regulations of the priests. These regulations prescribed certain attitudes, a certain position of the limbs, and a certain cast of feature, in the portraiture of the divinities, which gave a character of hardness, stiffness, and immobility to their figures. The figures were mostly in profile; the limbs and lineaments of the features angular, marked by straight lines. This style of engraving and of sculpture pervaded all their copies of the human form. Yet this defect—this deviation from the laws of nature—was compensated for by the vastness of their designs and their gigantic execution. They surrendered up grace and beauty for the awful and colossal; and in this department it must be admitted they have excelled. But wherever they were not fettered by the regulations of the priests,—for instance, when free to draw the figures of animals, such as the lion, sphinx, etc.,—they exhibited much ingenuity, taste, and elegance. Engraved gems were not only prized among them for the value of the stone and the labour and beauty of the engraving, but they were used for many purposes of real or imaginary good. They were worn as amulets, or charms against accident or evil—as medals, and marks of distinction for signal services in peace or war—as proofs of devotion and piety when they had on them the figures of their gods. The priests, too, wore them on their vestments. Among these gems were frequently the figures of Isis, Osiris, Orus, Anubis, etc.

The Egyptian art of engraving must be divided into two stages: the first, the old and purely Egyptian style; and the second, the Egyptio-Grecian, which took place when Egyptian gems were executed by Grecian artists, who, though engraving Egyptian subjects, and *generally* following the Egyptian rule, yet contrived to infuse into their works a character of motion, ease, and beauty.

"It was not," says Wilkinson (vol. iii. c. 9 and 10), in his learned work on Ancient Egypt, "in architecture alone the Egyptians excelled. The wonderful skill they evinced in sculpturing or *engraving hard stones* is still more surprising; and we wonder at the means they employed for cutting hieroglyphics on stones of the hardest quality. Nor were they deficient in taste—a taste, too, not acquired by imitating approved models, but claiming for itself the praise of originality, and universally allowed to have been the parent of much that was afterwards perfected with such amazing success by the most highly gifted of nations—the Greeks: and no one can look on the elegant forms of many of the Egyptian vases, and the ornamental designs of their sculptured stones, without conceding to them due praise on this point, and admitting that, however whimsical some of the figures may be in sacred subjects, they often showed considerable taste where the regulations of the priesthood and religious scruples ceased to interfere. In their temples they were obliged to conform to rules established in the infancy of the art, which custom and prejudice rendered sacred. Plato and Synesius both mention the stern regulations which forbade their artists to introduce innovations in religious subjects; and the more effectually to prevent this, the profession of *artist* or *engraver* was not allowed to be exercised by common or illiterate persons, lest they should attempt anything contrary to the laws established regarding the figures of the deities. . . . The same veneration for ancient usage, and the stern regulations of the priesthood, which forbade any innovation in the form of the human figure, fettered the genius of the Egyptian artist. The same formal outline—the same stiff attitude of the body—the same conventional modes of representing the different parts, were adhered to. No improvement resulting from observation in drawing the figure, no attempt to copy nature, and give expression to the features or proper action to the limbs, was resorted to.

(*To be continued.*)

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* "Among the Egyptian gems," says Dagley, "of which there are more intaglios than cameos, the greater part have the form of the consecrated *scarabæus*, or beetle; and the figures (or subject of the gem) are engraven on its surface They afterwards ground, or cut away, the lower part of the scarabee stone, cut into an oval form, to be more commodiously set into a ring or seal. Such was the origin of the oval engraved stones, which are still called *Scarabees*, although the figure of the insect no longer appears. The early Egyptians conceived the beetle to be the type of the *sun*, or the Divinity, the source of generation, because they thought the beetle had the power of self-production; and of *courage*, because they thought all beetles were males."

Trade Notes.

We regret to have to record the fact that the promises of improved business given during the month of December and part of January have thus far not been realised, and this year will probably prove an unremunerative one. Stock has been put in hand, absorbing capital, which is not in request, and the tendency is to part with it at reduced prices, in order to obtain the means for executing the few uncertain orders which come in. It has been the fashion of late years to refer to the watch trade as being especially and disproportionally depressed, but this is not borne out by facts. Jewellers, who have often been credited with the enjoyment of a steady flow of prosperity, are no better off than the manufacturers of watches or those of silver plate; and, furthermore, other staple industries of the country are in the same condition. When trade moves, it moves all round, and inquiries in Mark Lane or on the Stock Exchange will give an excellent idea of the prosperity of Clerkenwell or Sheffield. We can only sympathise with our readers, and urge them to keep up their spirits while waiting for the "turn of the tide."

Although suffering from the general depression which reigns now everywhere, the watchmaking industry at Besançon is still progressing. In 1883, according to the returns made by the Besançon Chamber of Commerce, the statistics show the production of watches the cases of which have passed through the hands of the Hall or "Controle" being composed of—

Gold	157,908
Silver	343,694
Total	501,602

for which they have received a sum of not less than 913,370 francs. The value of the watches produced in 1883 represents in the aggregate 22,014,530 francs, the equivalent of which in English money is £880,581 4s.

The average value of the gold and silver watch is 85 francs and 25 francs respectfully. At Besançon this industry employs about 15,000 hands, consisting of men, women, and children. The building destined for the Observatory is now completed, and is daily receiving the instruments, etc., and it will be opened at the beginning of June, a special department for the rating of watches being attached. —*Compte Rendu des Travaux.*

Messrs. J. Radges & Co., of The Butts, Coventry, have transferred their London business from 53, Hatton Garden, to more eligible premises at 4, Gray's Inn Road, Holborn, W.C. We should recommend watch-buyers to pay them a visit, as they offer at the present moment several very good lines in English-made watches.

In another column we publish an account of a number of prosecutions instituted under the Weights and Measures Act of 1878. The standing and undoubted integrity of the defendants prevents any stigma being attached to them; in fact, the business is of such a nature that any firm systematically using unjust weights could not maintain their position, as those who deal in articles composed of the precious metals, generally make a point of ascertaining their weight both before and after purchase; therefore any apparent deficiency in the apparatus was no doubt duly allowed for, and the proceedings can only be designated as being "vexatious."

We have received from Messrs. E. Gray & Son, 47, Clerkenwell Green, London, E.C., their new illustrated price-list. We are glad to see that some of our Clerkenwell firms are imitating the enterprise which characterises the manufacturing community of countries more go ahead than our own. This catalogue is creditable alike to the manufacturer and the printer, and intending purchasers of materials and tools should certainly not neglect to send for a copy.

We have also before us the new price-list of Messrs. Swinden & Sons, the old and celebrated Midland House, of 27, 28, and 29, Temple Street, Birmingham. This list, if not so pretentious as the preceding one, is very carefully got up, and will be found valuable to every one in the trade. The terms and prices offered are well worthy of attention, and that the quality is of the highest we take for granted; well knowing that this firm would not risk their well-known reputation by supplying the trade with inferior articles.

The additions and alterations to the building of the British Horological Institute are making satisfactory progress, although the cost will considerably exceed the original estimate. A special committee is now engaged in making arrangements to fit up the workshops. Mr. Ganney, during the reading of his paper at the Royal Aquarium, said that he was doing his best to persuade the committee to procure some improved machine tools. The chief difficulty seems to be that they could only be used for the instruction of pupils, and not for the purposes of production, as the Institute, by its constitution, cannot become a commercial undertaking.

A large clock has just been fixed in Chesterton Church Oxfordshire, which is fitted with all the most recent improvements. It strikes the hours upon a 14-cwt. bell, chimes the quarters, and shows time on a skeleton dial. It is the gift of Miss Drake, of Bignell House; and Messrs John Smith & Sons, Midland Clock Works, Derby, have carried out the work.

Watch and Clockmakers' Pension Society.

The subscribers to the above Society held their half-yearly general meeting at the Horological Institute, Northampton-square, on the 28th ult. In the absence of the appointed chairman, W. G. Connell, Esq., Trustee, the chair was taken by the Treasurer, J. U. Poole, Esq. The minutes of the previous meeting having been read and adopted, the usual election of officers was proceeded with, the chairman being re-elected Treasurer, and Sir John Bennett, W. G. Connell, Esq., and J. Franklin, Esq., Trustees. The following members were chosen to fill vacancies on the Committee:—Messrs. G. Ball, Jenkins, Pass, Ranstead, Singleton, Woodhouse, T. Collins, and Daldroph. The votes of subscribers for the election of a male annuitant were then declared as follows:—Plaskett, 340; Davis, 262; Hammon, 127; Scaife, 115; Calcraft, 106; Commander, 97; Johnson, 23. James Plaskett was therefore declared duly elected by a majority of 78, making the 229th pensioner elected since the Society was established in 1817. The Chairman then announced that a few days ago the Society had been favoured with a donation of £25 from the Goldsmiths' Company, and the Secretary also reported the receipt of a legacy of £10 10s. from the late Mr. Wright, of Broadstairs. The usual vote of thanks terminated the meeting.

Clerkenwell Jewellers and Defective Weighing Apparatus.

On the 15th ult., at the Middlesex Sessions House, before Mr. Hughes-Hughes (chairman of magistrates), Mr. J. E. Green, Mr. D. Hill, Mr. J. H. Lermitte, and Mr. R. A. Glover, thirty jewellers of Clerkenwell were summoned by Mr. Foulger, inspector of weights and measures, for having unstamped and defective weights and beams in their possession and use. At the outset the inspector explained that he had looked up the present cases, as there was a great falling off in the weights brought to be stamped.

Mr. Ricketts appeared for the majority of the defendants, and submitted that in most cases the defective beams were due to the small accumulation of dust which must necessarily follow their use; and, with regard to unstamped weights, it was extraordinary that all the defendants had scale-makers to look after them, and yet none had caused the weights to be stamped, as required by law.

Mr. Hughes-Hughes remarked that the tradesmen should have been more careful over their interests. He, in his magisterial capacity, looked particularly after his own affairs.

Mr. Ricketts.—The late Lord Chief Justice admitted that he had found it difficult to keep pace with recent legislation. Your Worships will also please to take into consideration that in most of the cases the weights and scales are used both for buying and selling.

In several cases it was urged that the weights complained of were not used for buying and selling, but merely for weighing out to the workmen. Some of the defendants, when asked to plead, said they supposed they were guilty if the inspector said so; and Mr. Vestryman Lowe, of Clerkenwell-road, said he did not admit having any unjust weights in his possession, and produced an invoice to prove the purchase of the weights and scales only two years since. He added that it was a singular fact that within two days of the inspector calling he received a printed catalogue of specimens of scales and weights. He did not use his scales and weights for buying or selling, but for his own work. Mr. Derby also did not admit any knowledge of the unjustness of his scales and weights.

Mr. Hughes-Hughes.—We are dealing very leniently with all these cases, as we are of opinion that you have all been ignorant of the lightness and the law.

Other cases disclosed the weights to be just, but that they had not been stamped; and the amounts which each defendant was fined merely represent the number of unjust or illegal weights, the rule adopted by the magistrates being 5s. for unstamped weights (inclusive), and 2s. 6d. each for the unjust.

A point which was very much contested, was as to the forfeiture of the light weights, the owners of these being of opinion that they should be allowed to take them away and have them adjusted.

The Inspector said this could not be allowed; it would be a bad precedent; and every weight would have to be adjusted under his eye.

Mr. Ricketts.—A little occupation for you.

Mr. Hughes-Hughes said he could not allow the return of the weights, and and impressed upon the defendants that it was in the power of the magistrates to inflict penalties of £5 in each case; but, taking into consideration that they had been taken by surprise, and were not dealing fraudulently, he only made it 5s.

In several cases the defendants said they had purchased their weights from respectable firms, and inquired if they could have redress in being misled?

The chairman replied, that he could not give advice in this regard.

The following are the names of defendants, with the amounts of fines:—J. C. Collingridge, £3 15s.; Richard Owen, £2 10s.; D. and C. Houle, £1 10s.; J. Bladon, £2 12s. 6d.; Messrs. Masters and Leete, £2 5s.; H. W. Curry, £2 7s. 6d.; Messrs. Derby and Co., £4 5s.; S. Roper, £3 17s. 6d.; A. J. Davenport, 15s.; J. Humphries, 12s. 6d.; R. Pringle and Co., £1; R. Hayes and Co., 17s. 6d.; Sheffield Smelting Company, 10s.; W. Clark, £1; Tillett, £1 5s.; Oakes, £1 10s.; John Pratt, 12s. 6d.; John Garrett, 17s. 6d.; F. Lowel, 5s.; F. Flint, 15s.; A. J. Blake, 7s. 6d.; Messrs. Johnson and Springthorpe, £1 7s. 6d.; Henry Loveday, 17s. 6d.; J. L. Bruce, 17s.

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Value of Pearls.

Although a pearl weighing one grain is worth only one-eighth of the price of a diamond of the same weight, it is very easy to spend a large amount of money for pearl jewellery. There is now in New York city a pearl necklace worth 100,000 dols. There is another worth 23,000 dols., and one was recently sold for 30,000 dols. These large prices are caused by the difficulty of obtaining particular sizes and colours that may be wanted. The most expensive collection of pearls on record is that owned by the Countess of Dudley in England, which is far more valuable than the celebrated pearls belonging to the Queen. The Countess has a coronet of pearls. The top is composed of pear-shaped pearls. There is a very large one in the centre, and the others are graduated in size down to the smallest. In order to get these pear-shaped pearls in the requisite sizes and colours, the jewellers were obliged to buy such an enormous quantity of pearls that when the famous necklace was completed, with earrings, bracelets, brooch, and finger-rings to match, the jewellers had 30,000 dols. worth of odd pearls left! A pair of matched pear-shaped pearls weighing 110 grains was recently sold in San Francisco for 6000 dols. When the Princess Royal of England married Frederick William of Prussia, she received a necklace of thirty-two pearls, costing 93,000 dols. In 1789 the French Government possessed pearls valued at 200,000 dols. One that weighed 108 grains was valued at 37,000 dols.; two that were pear-shaped were valued at 55,800 dols. The black pearls bring very high prices at present, but genuine pearls may be bought that are white, pink, or grey. The peculiar colour which is called pearl is a soft, transparent drab. There is at present a greater demand for pearls, as there is, in fact, for all kinds of jewellery, than has been known for a long time. The plentifulness of imitations does not appear to destroy the value of the genuine article.—*Pawnbrokers' Gazette.*

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Queries and Replies.

Would you kindly inform me through your columns how to get up a good yellow colour in electro-gilding? I am sometimes annoyed at the articles coming out of the bath a nasty green colour. What is the cause of this and the remedy?—(See the *W. J. & S.*, Jan., 1881, p. 76.)

Can any of your readers inform me of the best way to silver old English brass dials, and the best varnish to use for them?—H. G. S.

"Acid," for reply to question last month, is referred to the article on "Assaying Gold and Silver," published in July.

The Mechanic.

A man who is a thorough master of a trade carries his capital in his head. He is independent, and should be self-reliant, as his services will always be in requisition, unless, perchance, he has drifted into some section of the world where trade and manufactures are in a state of decadence. It may be an excellent thing to endow a youth with a splendid education, but often we find such young men failures in a business way. But there is no excuse for a first-class mechanic or engineer ever being found in such an unfortunate plight. The man possessing a good scientific or mechanical education who cannot make his way successfully through life must be composed of very poor material. The good mechanic needs no golden ladder to aid him in rising to success, nor is there occasion for his reliance on social standing or on the good offices of influential friends to open a path to fortune. Indeed, instead of seeking for friends, they will seek him. An expert mechanic, thrown out of employment, scarcely has the doors of his mill closed ere there comes a message urgently requesting his services elsewhere. A representative of an extensive manufactory, speaking of good mechanics, recently said, " We still have difficulty in obtaining all the expert help we need. This matter sometimes assumes a serious aspect, and we fear often that we cannot run our works to their best advantage for lack of the proper assistance." We here speak of the higher grades of workmen—of men who are proficient, and who have mastered their calling; but mechanics who have not risen to eminence, but have acquired a good reputation, are in most favourable positions—far better than the horde of ill-paid clerks, salesmen, and collectors who have chosen a calling that will save them from begriming their hands with dirt, and permit them to wear good clothes.

Speaking of the importance of the position of the mechanic, a contemporary very forcibly remarks, " Each ensuing day makes more prominent the fact that we have come upon the time when the mechanic is master. We have crowded professions and ill-filled trades. A chance to fill the position of sub-assistant clerk in a wholesale house is eagerly grasped at by a hundred applicants, though the wages received be scarcely more than 'a chance to learn the business.' Let a master workman try to obtain an apprentice at three times the salary offered the clerk, and his applicants will be poor alike in quantity and quality. A skilled workman in any trade need never want for hire ; he is eagerly sought after by a hundred employers ; he is independent of the condition of the market; the skill and cunning of his hand and eye are too valuable to lose, and must be paid whether the products are slowly or rapidly consumed. If business ceases, the master hand is eagerly seized by some rival house, which knows and values the product of his skill. He who would crush down the obstacles to success in our own days must have, as well as the wit to see the crevice, the strength to deal the blow. This is an age of the steam-engine, and it is the engineer, not the conductor, who is master."

The man who can do a piece of mechanical work, or who can invent a successfully working machine or plan its erection, is a valuable member of society. He is a producer, and the world is both richer and better for his presence. His calling demands a fine development of intellectual thought, and, although the mental conception requisite to do a fine bit of mechanical work may not be of the same high order as that required of a sculptor or painter, yet it is of a high degree of merit, and may equal, in special circumstances, the efforts of the best artists in any of the various schools. It is a narrow-minded man who despises the mechanic because of the surroundings of his labour. Those who look down on him are generally men of inferior intelligence, who possess a poor conception of what is worthy of admiration, and whose esteem would be of little credit to any one.—*Chicago Watchmaker and Metal-worker.*

Melting Sovereigns.

It not unnaturally surprises many persons that the coins of the realm may legally be melted down and devoted to less dignified uses; but the practice was undoubtedly legalised by 59 Geo. III. c. 49, s. 11, when melting and exporting were treated together, and both expressly permitted. That statute repealed 9 Edward III., by which the melting of "sterling half-pennies or farthings" was forbidden; 17 Richard II. c. 1, in virtue of which "no groat or half-groat" was to be melted; and 13 Charles II., by which the same prohibition was extended generally to current silver. There appears to have been no statute forbidding the melting of gold coin, but this was specifically allowed in the Act of 1819, and, although the Act is repealed, it cannot be said to be an offence at common law for a man to put his own gold or silver into the melting-pot because it happens to be stamped with an impression of the Sovereign's head. If that consideration were sufficient, it would be a misdeamour to light one's cigar with a sheet of postage stamps. The illegality of melting coin is as old as the *Lex Cornelia*, which forbad melting as well as debasing and "washing;" but according to modern ideas the subject is allowed to test practically whether the sovereign is worth its weight in gold by turning it into Birmingham jewellery, notwithstanding the disrespect shown to the Queen's image and superscription.—*Law Journal.*

Watch Oil.

From the "British Cyclopædia" for 1835.

"It cannot but be known to all how much the quality of the oil used by watchmakers for oiling the works of their delicate machines is of importance to them.

"Colonel Beaufoy remarked that, if olive oil be exposed to the rays of the sun for a considerable length of time, it becomes colourless, clear like water, free from mucilage, and does not easily freeze. This effect was produced by exposing two half-pint phials, nearly filled with oil, to the sunbeams for a couple of years; the bottles were uncorked occasionally to let out the gas.

"Chevreul has recommended the following process for freeing oil, for the use of watchmakers, from any acid or mucilaginous matter:—Put some salad oil into a matrass, or one of the Florence flasks in which it is imported, and pour on it eight times its weight of spirit of wine; heat the mixture until it is ready to boil; then pour off the spirit of wine, and let it stand to cool. A portion of solid fatty matter, called stearine, separates, and is to be taken away; and then the spirit is to be evaporated away in a basin, or distilled in a glass retort, until about one-fifth part is left; by this means the fluid part of the oil or elaine, as it is called, will be separated and deposited. This elaine ought to have the consistence of oil, be colourless, with little or no taste or smell; it should not discolour litmus paper, neither should it be easily congealable by frost."

Electro-Plating with Nickel.

By William H. Wahl.

[A paper read before the Chemical Section of the Franklin Institute, and published in the Journal of the Institute.]

(Continued from page 161.)

THE results of extended practical trials of Mr. Weston's formula, made by the writer, have convinced him of the substantial correctness of the claims of this inventor. Where the double sulphate of nickel and ammonium is used the addition of boric acid in the proportion of from 1 to 3 ounces to the gallon of solution gives a bath less difficult to maintain in good working order, and affords a strongly adhesive deposit of nickel. The deposited metal is dense and white, approaching in brilliancy that obtained from the solution of the double cyanide.

In 1880, J. Powell,* of Cincinnati, patented an electro-depositing solution "composed of the pyrophosphate of soda, phosphate of nickel, the bisulphite of soda, and citrate of nickel and ammonia."

In the same year C. G. Pendelton,† of New York, patented the use of an acid solution of the acetate of nickel. The inventor emphasizes the caution that this solution must always be kept acid. The metallic strength of this solution is fully maintained by the solution of the anodes, and the bath consequently requires no additions of fresh salt.

An interesting suggestion is that patented in 1880 by Mr. Powell,‡ and which covers the use of benzoic acid in nickel-plating solutions.

In describing his improvement Mr. Powell calls attention to the fact (?) that simple salts of nickel cannot be used on account of their failure to yield a regular deposit. He claims to have discovered that the addition of benzoic acid to any of the nickel salts arrests in a marked degree the tendency to an imperfect deposit, and prevents the decomposition of the solution and consequently the formation of sub-salts. The amount of benzoic acid necessary to be added to the bath for this purpose is said to be ⅛ ounce to the gallon of solution. He, therefore, claims "an electro-depositing solution consisting of a soluble salt of nickel, its solvent, and benzoic acid." This bath is reported to give very satisfactory results.

In the same year, Mr. J. H. Potts,§ of Philadelphia, was granted a patent for an improved solution for the electro-deposition of nickel "consisting of the acetate of nickel and the acetate of lime, with the addition of sufficient free acetic acid to render the solution distinctly acid." Mr. Potts prepares his bath as follows:—He precipitates the carbonate of nickel from a boiling aqueous solution of the sulphate by the addition of bicarbonate of sodium, filters and dissolves the well-washed precipitate in acetic acid with the aid of heat.

The acetate of calcium he prepares by treating caustic lime, or the carbonate (marble-dust), with sufficient acetic acid to dissolve it with the aid of heat. The solution of these salts is acidified slightly, but distinctly, with acetic acid.

This solution, which I have worked with under a variety of circumstances, is in many respects an excellent one. It gives satisfactory results, without that care and nicety in respect to the condition of the solution and the regulation of the current which are necessary with the double sulphate solution. The metallic strength of the solution is fully maintained, without requiring the addition of fresh salt, the only point to be observed being the necessity of adding, from time to time (say once a week), a sufficient quantity of acetic acid to maintain a distinctly acid reaction. It is rather more sensitive to the presence of a large quantity of free acid than to the opposite condition, as in the former condition it is apt to produce a black deposit, while it may be run down nearly to neutrality without notably affecting the character of the work. The deposited metal is characteristically bright on bright surfaces, and requiring but little buffing to finish. It does not appear, however, to be as well adapted for obtaining deposits of extra thickness as the commonly used double sulphate of nickel and ammonium. On the other hand, its stability in use, the variety of conditions under which it will work satisfactorily, and the trifling care and attention it calls for, make it a useful solution for nickeling.

Formulæ for Nickel-plating Solutions.

No. 1.

Double sulphate of nickel and ammonium ..	5 to 8 parts.
Water	100 ,,

Dissolve the nickel double salt in above quantity of water with the aid of heat. Cautiously add ammonia, or the sulphate of ammonium, until the solution is neutral to test-paper. This solution should be maintained as nearly neutral as possible in use. This is commonly known in the United States as the Adams solution. It is in very general use by nickel-platers throughout the United States, and yields, where properly managed, excellent results.

No. 2.

Double sulphate of nickel and ammonium ..	10 parts.
Boric acid (refined)	2½ to 5 ,,
Water	150 to 200 ,,

(Weston's solution.) The superiority of this solution is generally acknowledged. The deposited metal, as previously remarked, is almost silver-white, dense, homogeneous and tenacious, and the solution maintains its excellent working quality very uniformly in long-continued service.

The nickel salt and boric acid may be dissolved separately in boiling water, the solutions mixed, and the volume brought up to that of the formula, or the two components may be dissolved together.

No. 3.

Acetate of nickel	2¾ parts.
Acetate of calcium	2¼ ,,
Water	100 ,,

To each gallon of this solution add 1 fluid ounce acetic acid, 1·047 sp. gr.

To prepare this bath, dissolve about the same quantity of the dry carbonate of nickel as that called for in the formula (or three-quarters of that quantity of the hydrated oxide) in acetic acid, adding the acid cautiously, and heating until effervescence has ceased, and solution is complete. The acetate of calcium may be made by dissolving the same weight of carbonate of calcium (marble-dust) as that called for in the formula (or one-half that quantity of caustic lime) and treating it in the same manner. Add the two solutions together, dilute the volume to the required amount by the addition of water, and then to each gallon of the solution add a fluid ounce of free acetic acid, as prescribed. (Potts' solution.)

No. 4.

Sulphate of nickel and ammonium	10 parts.
Sulphate of ammonium	4 ,,
Citric acid	1 part.
Water	200 parts.

The solution is made with the aid of heat, and, when cool, small fragments of carbonate of ammonium should be added until the bath is neutral to test-paper.

(To be continued.)

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* Consult U. S. Pat., No. 228,389, June 1, 1880.

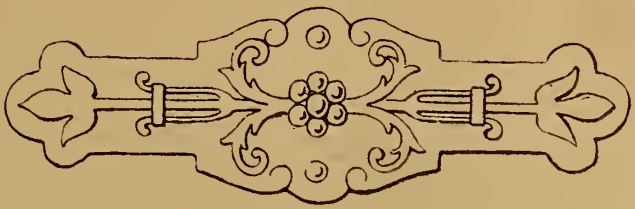
† Consult U. S. Pat., No. 232,615, September 28, 1880.

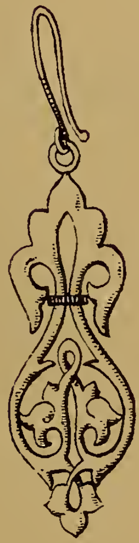
‡ Consult U. S. Pat., No. 229,274, June 29, 1880.

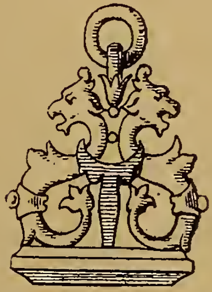
§ Consult U. S. Pat., No. 232,755, September 28, 1880.

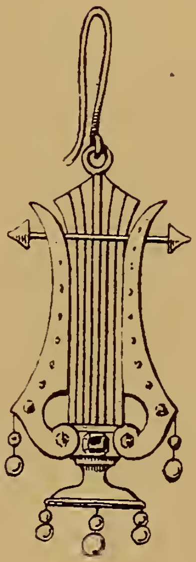
Supplement to the Watchmaker, Jeweller, and Silversmith, June, 1884.

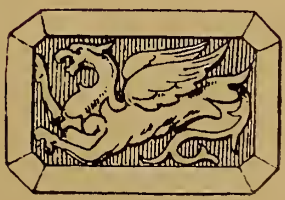
MONTHLY SUPPLEMENT OF DESIGNS.

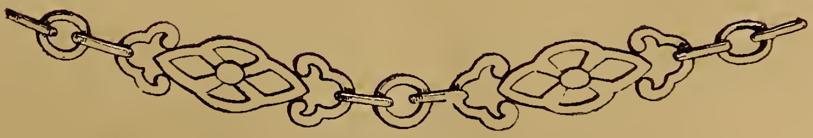












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ILLUSTRATED SUPPLEMENT:—"Designs for Modern Jewellery."

The late Mr. William Bragge, of the English Watch Company.

NOR poet, nor sage ever penned a profounder maxim of philosophy, than did our own Milton, when he recorded for immortality, "Peace hath her victories no less renowned than war." The deceased gentleman, who has lately closed, though prematurely for the autumn of his days, a full-working and honourable career, was a practical illustration of the manner of man whose ever-moving upward and onward intellect achieves those victories that, for the benefit of the human family, are even *more* renowned than war. It may truthfully be said of him what the readers of classic history found that Africanus the Elder said of himself:—"I am never *less* at leisure than when I am at leisure, nor *less* alone than when I am alone." Cicero, commenting upon this, adds:—"A splendid saying, and worthy of a great and wise man, which shows that he used to deliberate on affairs in his leisure hours, and to converse with himself when he was alone; so that he never was idle, and sometimes did not require the society of others. Therefore, the two things which cause languor to others—namely, retirement and solitude—roused him." The ancients tell us that every man has lived long enough, who has gone through all the duties of life with unblemished character; and, although the bereaved are within the flowing grief of their natural feelings, the sentiment just expressed may have to a certain extent some consolatory influence. As the accounts which have appeared in the local papers are more or less wanting in several particulars, the following statement, partly in accordance with them, may be accepted as complete in the details contained.

He did not "place" himself, nor "put" himself anywhere as has been mistakenly told, but he was regularly apprenticed to mechanical engineering, and began his work in the world after the time-honoured, recognised manner of pupil mechanicians. But he was even then known as a youth of more than usual aptitude for his years, and eagerly availed himself of such opportunities as the circumstance of his surroundings afforded to study the theory in conjunction with the practice of mechanical science. As it has been well said of him, "He had this fine quality, that in whatever station he might be, he always prepared himself for something beyond and better." In proof of this, it can be added that during his apprenticeship he became an accomplished arithmetician and an expert mechanical draughtsman. In the engine factory of the Midland Railway Company at Bromsgrove the bent of his mind became known; and when his apprenticeship ended, and he became a fully qualified journeyman, he still pushed on his special studies, mastering in addition the principles and practice of land-surveying and mensuration. He seemed to have a presentiment of what was before him, and worked on accordingly. *Quid datur a divis felici optatius horâ*:—"What can be granted by the gods more desirable than a lucky moment?"; or, as Shakespeare has beautifully expressed it in the tent scene between Brutus and Cassius:—

> "There is a tide in the affairs of men,
> Which, taken at the flood, leads on to fortune;
> Omitted, all the voyage of their life
> Is bound in shallows and in miseries."

The tide came, and the young engineer took it at the flood and sailed to fortune upon it. His opportunity culminated in the laying out of the Chester and Birkenhead Railway, and the junction lines about the docks. The full name of the line was the Birkenhead, Lancashire, and Cheshire Junction, Mr. John Laird, of the above town, being chairman, and Mr. John Lister, engineer-in-chief. It was as a colleague of the latter gentleman that Mr. Bragge worked, but afterwards, we believe, took charge of the line. He subsequently became acquainted with Messrs. Fox, Henderson & Co., and upon their recommendation he was sent out as chief engineer to construct gas-works at Rio de Janeiro. We omitted to mention just now, that when he was engaged upon the Birkenhead and Chester system, he made original investigations into the relative strength of the market brands of iron then in vogue, and demonstrated that the highest-priced article was not always of the best quality.

Whilst in Brazil he surveyed and superintended the construction of the first railway in that country, and by doing so became the pioneer of railways in South America. The line was one from Rio de Janeiro to Petropolis, the mountain home of the emperor. So pleased was His Majesty with Mr. Bragge's ability, that he conferred upon the latter the order of the Rose and, to a considerable extent his personal intimate friendship. Upon leaving there, the young engineer went to the river Plate, and recommenced railway and gas-work construction. At Buenos Ayres he found the inhabitants suffering seriously from want of water. He had some thousands of wells sunk, and the pumps driven by windmills, which contributed largely towards the irrigation of the land.

It was during his South American travels that he made the famous collections of the pipes and tobaccos of almost all nations, which alone were sufficient to mark him as a wanderer of no common order. The present writer has enjoyed the rare pleasure of seeing those collections and having heard Mr. Bragge, himself, dilate upon them in his own house. There were over 13,000 specimens, and the grand folio catalogue filled seventeen volumes, illustrated in most instances by his own hand. He was a good smoker, himself, and as may be understood kept the best of "everything in that way" for his guests and visitors. But pipes and tobacco specimens were not all his curiosities, for he had rarities from every part of the world—Russia, India, China, Japan, Turkey, Indian America, Mexico, in fact everywhere where money and the power of choosing could be used. It is not over-stating the mark to say, that there was no dealer in "curios" in the circle of the globe who did not know the name of William Bragge. Even the Eskimos, the natives of the Falkland Isles, the Gold Coast, Thibet, and Australia had contributed to his invaluable store. He had samples not only of tobacco, but of everything to make it pleasant both to the mouth and nose, including the rare Chinese snuff-bottles, and also all the methods known of striking fire for the pipe, from the rude Indian fire-drill down to the latest invention in fusee or vesta. His great Nicotian museum presented in its entirety a practical history of the smoking appliances of the denizens of this earth. He had besides, manuscripts of a thousand years ago—hundreds of specimens of the handwriting of different nations in every stage of advancement, in addition to coins, crosses, relics, and jewellery from wherever he could obtain them. He was nearly always travelling; indeed, it was said of him that when he became one of the firm of the celebrated John Brown & Co., of Sheffield, he kept a portmanteau packed ready to start at an hour's notice—which he often had to do—for St. Petersburg, Moscow, or Constantinople! Having acquired a lingual fluency in French, German, and Spanish, he was well able to be "at home" throughout the whole area of mundane civilisation. He used to call those journeys the "big errands" of the firm. He naturally came into contact with the leading people of the places he went to, and when he became known to them he was treated with a noble dignity worthy alike of his mission and of his fine personal character. His collections have often been exhibited at public institutions, and they represented the careful gatherings of thirty years. It is to be deeply regretted that upon the announcement of their dispersion they were not all purchased in their entirety for the British Museum, or if not, for Birmingham itself. He had a collection of the works of Cervantes, the great Spanish satirist, and of books bearing upon that author, extending, it has been stated, to fifteen hundred volumes. It was known as the Cervantes library, and was valued at a large sum. That treasure he presented to his native town of Birmingham, where, unfortunately, it was destroyed by the fire that occurred there some five years ago. The authorities, however, secured afterwards his beautiful cabinet of gems and precious stones, which can now be seen in the temporary Art Gallery.

Mr. Bragge terminated his south American engagements in 1858, when he returned to England, and joined, upon invitation, the then young firm of John Brown & Co., of the Atlas Iron, Steel, and Spring Works, of Sheffield. The firm has long been celebrated for the manufacture of armour-plates, for the ships of war of all nations. We believe that those large works cover nearly thirty acres of ground. This is the firm for which Mr. Bragge became the travelling partner, and for which he had to run all over Europe and America on the "big errands" in search of orders. But his most difficult search was to get in London an order for the startling innovation of steel rails.

He remained in the Atlas Works until 1872, when he retired for the purpose of dealing with the sewage difficulties of Paris. Upon leaving the works he was presented with a service of silver plate, of the value of three hundred guineas, by his colleagues, and a silver salver by the clerks and workmen. The presentation was made by Mr. Mundella, M.P., for the borough, and still a member of Parliament. Mr. Bragge was, at the time, a comparatively rich man, but, unfortunately, he lost large sums of money by various ventures, and by the failure of the firm of Colley, Colley and Co., of London and Paris, the effect of which upon his health can be readily understood. We must mention that he had been Master Cutler, of Sheffield, an Alderman, and held other civic positions of a similar character. However, he determined to return and settle for good in Birmingham; he was a Birmingham man to the back-bone, flesh and blood and spirit, and he was a great honour to them. It will be proper to mention here, that in retiring from the Atlas Works, it was the position of managing director that he relinquished, as he continued a director until the time of his death. The seventeen great volumes of his Tobacco Library are enriched with many thousands of plates in illustration of the text. He had been for many years a fellow of the Society of Antiquaries, and also of the Royal Geographical Society. He had certainly sufficiently qualified himself for the membership of both learned bodies. During his residence at Sheffield he did much for the people among whom he dwelt, in the way of education. He was always promoting it, either in free libraries or museums, or in some similarly appropriate way. Besides his specimens of pipes and tobaccos, and the complete literature belonging to them, he had examples of many schools of painting, and writing in the following languages, namely, Chinese, Japanese, Hindostani, Persian, Egyptian, Byzantine, Hebrew, Greek, Italian, Spanish, German, and French. There were also Latin Bibles, and Missals written upon vellum and wonderfully illuminated. Some of them are said to have gone, in company with a goodly troop of pipes, to the British Museum. The sale took place in London, in June, 1878, five years ago, and although the market for such a purpose was low, the collection realised £12,272, and occupied four days in its disposal. He was ever on the look-out to enrich some place with which he was connected, by gifts; even for Sheffield he completed a collection of metal work and cutlery applicable to the trade of the town, which led to the foundation and opening of the Weston museum. He furthermore obtained from Mr. Von Julin, the great cutlery manufacturer of Russia, a complete series of the styles and specimens of that kind of work throughout the Russian Empire.

An event of locally historical importance occurred when Mr. Bragge terminated his personal connection with the town of Sheffield. That was the presentation to him of his portrait and a highly artistic illuminated address, occupying four pages of vellum, and ornamented with harmonious emblazonry. Both of these honours were the gifts of those who deemed the recipient worthy of some lasting record of the esteem in which the grateful donors held him. The valuable services which Mr. Bragge had conferred upon the town, culminated in a joint resolution of the Council of the School of Art, the Council of the Free Library and Museum Committee of the Town Council, and of the Council of the Literary and Philosophical Society, and other gentlemen, in 1877, and a subscription list was immediately opened, and almost as immediately filled. A commission for the portrait was given to Mr. R. Smith, and for the address to Mr. Nadder, both local celebrities in their respective departments.

The interesting ceremonial took place in the Cutlers' Hall, upon September 4th, 1878, in the presence of members of the family, and a large gathering of the most distinguished citizens of Sheffield. The portrait represents Mr. Bragge seated in his library at Shirle Hill, the accessories being composed of his famous collection, so far as it could be shown without overcrowding the main features of the picture. The work gave unbounded satisfaction to the subscribers, who one and all warmly congratulated the artist upon his success. As we have just stated, the address is upon four pages, and is executed in the early Italian style of illumination. The arms of the Cutlers' Company are heraldically set forth on the right-hand side of the border of the page that shows the beginning of the address; the arms of the town of Sheffield are on the left side—Vulcan resting on his hammer and anvil, Mercury of the winged feet speeding upon his errand, and the sheaf of arrows on its shield below, all protected by the outstretched arms of the "angel of plenty," holding a bunch of grapes in one hand, and the emblem of peace in the other. The motto of the arms has been aptly chosen, namely, *Deo adjuvante labor proficit*, which may be freely rendered—"With God's assistance we will advance our work." In addition to these there are the arms of Mr. Bragge in the centre of the same border, whilst the first page of all has a photograph of the whole of the picture, enclosed in a gold ornamented border of its own. The text of the address is in old English, and the carefully studied, highly wrought binding of the sheets is by the Messrs. Townsend, of Sheffield.

In his reply to the presentation speeches he said "I was the first individual who ever sold a steel rail. When I offered steel rails to our great engineers of George Street, London, they told me, 'Mr. Bragge, you had better go home and put yourself under the care of your friends.' (Laughter and cheers.) The chairman of the London and North-Western only last week congratulated his shareholders on the great decrease of the expense of maintenance of the line, and told them that the decrease was only now commencing, and that year by year they would derive larger and larger benefits from this diminished expenditure on maintenance, because the London and North-Western Railway had laid 800 miles of double railway with steel rails." (Cheers.)

He lived to see the laugh on his side, and it is to be greatly lamented that he did not live on to the extreme limit of the course of nature.

In the year 1872 a small manufactory for making watches on the interchangeable principle, by means of American machinery, was started at Lozells, Birmingham. A few years afterwards it came under Mr. William Bragg's observation, and he purchased it. Neither the machinery, nor the work that it produced, was at all up to the standard which he deemed necessary for a good, enduring, sound, English watch. He, accordingly, gave the order both for new machinery and a reorganization of the whole *modus operandi*. In that he was ably seconded by his engineer and those about him, and a great deal of money had to be laid out, sown like so much seed for a protracted, if not problematical harvest. A somewhat detailed description of the works as they then were, was given in this journal in September, 1877, by the present writer. That was the first time that any special account of watchmaking by machinery had been addressed to the trade in this country, and the surprise that it created was correspondingly great. Indeed, there were watchmakers of "mature age" belonging to the old, old school who stoutly asserted that the author of the paper had been freely assisted by an exuberant imagination. Evidence, however, both oral and practical, began gradually to make itself felt; and although the harvest was tardy, the lamented gentleman lived long enough to see that it was sure, and that the English Watch Company which he had founded, had become an established industry in the production of English watches. We have been told that what we saw in 1877, was antiquated compared with what we should find now, and that improvements are still going on. It may be that, before the present year is over, we may have something to say with respect to what has been done; at all events, we shall be glad to give our readers the benefit of all that we can learn in that direction, when the proper time arrives.

Such is the last business upon which Mr. Bragge was engaged. Although he was an inventor in various ways, he never patented anything. What was most striking in his private character was his abnegation of self. At his hospitable board the guest was insensibly led to soon feel himself at home, whilst the host would converse upon any subject except his own many adventures. Occasionally he would relate an anecdote which claimed attention; but he had the greatest dislike to talk about himself. When the present writer was on a visit to him, in the autumn of 1880, it was suggested, and, indeed, urged upon him, that a published account of where he had been and what he had seen—the strange countries, the strange people, and the strange manners—would prove more fascinating—because of its truthfulness—than the most romantic complexities of legendary lore. His invariable answer was: "That he had some idea of putting a few of his little adventures together, but could not depend upon finding the time for the purpose." Even whilst replying in this way, his genial laugh seemed to peal out: *Assem para, et accipe auream fabulam*,—"Give me a penny, and I will tell you a story worth gold."

Mr. William Bragge was born in Birmingham on the 31st May, 1823, being one of a family of ten children, of whom seven survive. Their father was Mr. Thomas Perry Bragge, a well known manufacturing jeweller in that town. Mr.

William's wife pre-deceased him several years ago, and a family of three sons, unmarried, and two married daughters survive him. He had completed his sixty-first year, but for a long time his failing sight, terminating in almost total blindness, sadly marred what little enjoyment was within his reach. After a gradually increasing weakness he died at his house in Hall Road, Handsworth, on the night of Friday, June 7, 1884, leaving a more than usually large circle of family, relatives, and friends, to mourn his loss. His work was done, and there was the fair expectation that, in the course of nature, he could have resignedly contemplated for years to come the almost insensible decline of that mortal sun, that in the ripe old age of a well-spent life slowly and surely sinks into the great ocean of eternity! *It was not to be.*

Charles Stuart Murray.

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The Properties of Gems.

By W. J. Abbott.*

Introduction.

THE other day a well-known diamond-broker in a large way of business submitted to me a stone, asking what it was, as it formed part of a lot he either had bought or was going to buy, and for which the sum of £80 was to be allowed. I fancy I see the flight of colour from his usually imperturbed face as I assured him it was only a garnet, not worth so many pence; which was indeed the case, it being only a very poor one, of a very typical form—the rhombic dodecahedron. I have known a West End jeweller bid very high and try very hard to get possession of a bright-red stone from the widow of an Indian officer, under the belief that it was a ruby, when it was nothing more than a similar typical form of garnet. I have known parcels of stones by the hundred sent over to this country from abroad, with the full assurance that the jewellers had all pronounced them diamonds, rubies, or what not, when, with the knowledge that I hope to lay before your readers, they would have been just as likely to mistake our old friend "Jumbo" for a grizzly bear as to fall into such grave errors. Nor is this lack of knowledge confined to colonial jewellers. I have known a good colour cabochin ruby, of very large size, mounted as a pendant, marked up in the usual stereotype, "Fine gold, real stone," only 27s. 6d. I once saw in a large city house, marked up at the modest price of three figures, a stone set forth as a "fine old brilliant," which was only a phenakite! These are not isolated instances; I could quote more extravagant ones that have come under my immediate notice. Now surely, so long as such a lack of knowledge as this exists in the trade, we can never expect to make the best of the bad times. It is often pointed out that the "Stores" are at an immense disadvantage with the manufacturer and the shopkeeper, because they are so far behind them in knowledge. If we thus recognise in our trade what has long been acknowledged in many others, viz., that a true knowledge of that which underlies a trade is absolutely indispensible to *perfect* success in it, I venture to think there is a splendid field open for the City Guilds, more especially the Goldsmiths', to appoint a competent lecturer upon precious stones, so that assistants (or masters, if they wished) could learn in two or three sessions what would now take six or seven years' reading and study to acquire, or which indeed could never be learned from books. I am fully and, I might say, painfully aware that many are still opposed to technical or scientific training, and only look upon it as the very antithesis of *practical* (that word "practical" has such peculiar meanings in the minds of many), and regard it as so many algebraic formulæ which exist only upon paper and in the minds of theorizers. Allow me at once to say, that thinking scientifically no more means that, than does speaking grammatically parsing every sentence when speaking: it merely means the collection of facts which educated common sense can discern, and tabulating them; no matter how insignificant and simple a fact may appear at first sight, if it is a fact, it is worth remembering—a something that can be turned to good account, and it is a mark of identification—a distinguishing characteristic. In these articles I shall endeavour to point out a number of facts concerning gems, which may be regarded as their distinguishing characteristics or properties, which properties can be shown to have a scientific foundation—although I shall endeavour to be as untechnical as possible—and which I trust will enable my readers to determine what a stone is when they see it, whether it be rough or cut. In doing this, I trust I shall awaken many to a sense of the charming optical qualities of some of the gems, and thus stimulate a new interest, and call forth the inventive faculties, so as to result in many new and happy blendings in the so much neglected art of stone-setting.

We walk in groves through a boundless country, with immense riches on all sides of us: only let us learn the principles of navigation—or the laws of harmony and the peculiar properties of gems—and we can launch out into green pastures, lovely gardens, or mines of wealth. A piece of jewellery-work should not be a pattern, expressed in black and white, copied from each other's catalogues; but each piece should be a picture—a work of art. I am fully aware that the dominant idea in "the struggle for trade" is "what sells best;" but I am also aware that there are thousands travelling about from country to country—people who really have the money to spend—looking for anything new and more beautiful, and if the art were improved my experience assures me that patrons would be found.

Rough Stones.

In looking at a gem-crystal, the first thing that strikes one's eye is generally its outline; and if there is one thing that nature is orthodox about, it is *form.* Colours may vary almost from one end of the spectrum to the other, in stones of the same kind; specific gravity and hardness vary within certain limits; but *form* in crystals is a constant quality. Whenever a diamond crystal occurs, it occurs in a shape referable to a certain system of crystallization; and whenever a crystal of sapphire or ruby occurs, it occurs in a six-sided figure, referable to another system; and the same may be said of every gem-crystal—each will always be found in a shape peculiar to it. Crystallographers divide all the thousands of possible forms of crystals into six systems, and they are named by Dana—(1) the Isometric, (2) Dimetric, (3) Trimetric, (4) Monoclinic, (5) Triclinic, and (6) Hexagonal systems. These names, I might observe, are derived from the relation of the faces of the crystals to certain imaginary lines called axes, which are supposed to run through the crystal, crossing in the centre.

It is with the first and last of these that we shall have most to do, as the (diamond) spinel and garnet crystallize in forms of the former, and the many varieties of sapphires, rubies, emeralds, tourmalines, quartz, etc., in the latter; whilst the chrysoberyl, alexandrite, topaz, and chrissolite crystallize in different forms of the trimetric; the zircons and idocrase assuming forms in the dimetric. Intimately related to the crystalline form is the subject of cleavage, or facility with which stones can be split in certain directions, thus exhibiting cleavage faces, from which the crystallographic system of a gem can be determined even when the crystalline faces are obliterated. This will necessitate a few words upon surface-structure, in order to be able to identify a cleavage face from a fractured face, which latter may be conchoidal, as in silicates, uneven, splintery, or hackly. There are also two other phenomena that will call for our attention, depending upon, and arising from, the internal or molecular construction of gems, which also bear certain relations to their crystallography,—viz., those by which the charming effects known as cat's eyes and star-stones are produced. In the former, not only will the phenomena be explained and described, but all the various kinds of minerals which are passed off as cat's eyes be enumerated and described. In the latter the phenomena that gives rise to stars be explained, varieties enumerated, the number of rays possible in each given star, and the angles which are included between the limbs of each respective star, indicated. There are also several gems that do not assume a crystalline form that will require explanation.

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The next physical property of gems is their *hardness*, e.g., a diamond and a crystal of fluor spar crystallize in the same system (I have often known them to be taken the one for the other); but by their hardness, which may be readily determined, the difference may be seen at once. So again with a white sapphire and rock crystal, or it may be a water-worn pebble of some gem—a yellow sapphire, a topaz, or a piece of quartz, or a ruby, or a garnet: its hardness will at once determine its nature, if we only know how to ascertain and use it.

The next most important property of gems by which they can at once be determined is their specific gravity. By specific gravity is meant the relative weight of a gem compared with another of the same size, or any other substance that we may choose to take for a standard: e.g. if we take a cube of diamond which has for its side a square eighth of an inch, we find that it weighs ·0036 of an oz.; but a cube of similar dimensions of ruby might weigh ·0044 oz.; showing that the ruby is far the heavier, bulk for bulk, whilst cubes of the same dimensions of various other gems would weigh other weights, in some instances more, and in some much less.

The questions which then naturally suggest themselves to us are, firstly, Is the relation of the weight to the bulk of gems constant within well-defined limits?—secondly, How can this be practically and easily shown? Both questions are answered practically by adopting some standard, and then comparing as many specimens as we like of any given gem, and they will be found to vary within certain limits, which may be regarded as their maximum and minimum specific gravities; not that the specific gravity of a gem is greater at one time than another (reduced to the same conditions), but in half-a-dozen stones of the same kind there might be a slight difference in each, but whatever the specific gravity of any gem at one time, that would it always be. Now the very best standard possible is water, at a certain temperature and under a given atmospheric pressure. Reverting to our one-eighth of an inch square cube, we find that a cube of water of those dimensions weighs much less than the diamond cube, and still less than the ruby; and, further, we may find that our cube of water, when at any given temperature and under any given atmospheric pressure, always weighs the same, although its weight varies with the change of temperature and pressure, it being a well-known law that liquids expand with heat very, very much more than solids; but as this expansion is subject to well-known laws, deductions can readily be made for any conditions under which one may operate. It is found that water is at its densest form at 4° C., and that is the temperature, at a pressure usually to be found at the sea level, used for comparison of specific gravities, although 60° F. is sometimes employed; but it is necessary to have some definite temperature for the standard, and also to know how to reduce calculations made upon a hot summer's or a cold winter's day to the recognised standard. These deductions may sometimes be ignored; but tables will be given subsequently, in case *exactness* may be required. Suffice now to say that if a cube of a gem weighed three-and-a-half times as heavy as a cube of similar dimensions of water, it would be said to have a specific gravity of 3·5; or if four times as much, of four, etc. We are thus brought to the various methods of taking specific gravities, the most practicable of which will be described, and likewise extensive tables of specific gravities given.

Passing the chemical composition of gems, that belonging to their natural history, we are next brought to consider the perhaps most important of all properties, viz., their optical properties; and upon these I purpose dwelling at a greater length than perhaps has ever been done, and I hope to be able to lay before my readers facts which they can verify for themselves, easily observe, and generally employ as positive tests in the discrimination of gems. They will *not* consist of the enumeration of optical laws laid down by physicists, backed up by an array of algebraic and trigonometrical formulæ, but will chiefly be extracts from the notes of my most simple researches made, for the most part, within the last two years, and will relate to, firstly, *their surface lustre*, either from a crystalline or polished surface, and will include reflection and dispersion, and probably polarization; secondly, *the transmission of light through the gem.* This will embrace the phenomena of single and double refraction, mono-, di-, and plio-chroism, especially the second, with a thorough description of the dichroscope and the proper method of using it (which, so far as I am aware, has never yet been published), also the reflection and decomposition of light by the inner faces of gems. I venture to think that if we can get to understand these properties of gems, and which of them are possessed by any particular gem, the chief of which will be duly recorded and pointed out as we pass, that something more of gems will be known than is now generally found to be the case.

(*To be continued.*)

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The Patents, Designs, and Trade Marks Act of 1883.

By C. Stuart Murray.

(*Continued from page* 168.)

WE now come to legal proceedings in connection with the Act, which proceedings every man ought to know something of. The explanations which I am about to give are not intended to supersede the lawyer, but to rather indicate where the trained skill of that gentleman may be necessary. The one grand thing in going to law is to know *how*, coupled with the *worth-while* part. Unless one is satisfied in the combination of those two "importants," it will be hardly "worth while" to begin. I once "went to law," when I thought that it was worth my while, and because I knew how. It was for some twenty pounds for "work done and delivered;" and a "friend" of mine, a solicitor, whose practice I afterwards learned was very lean, undertook to take the drudgery off my hands, I being at that time in rather full practice of another kind. After service of the writ, the affair was compromised for £15 and costs; and I was glad of it, because I was busy. I was counting my gains, and called in due time for the money; but my friend, the lawyer, "had been suddenly called off to Wales." He was several weeks away; and when he returned, I "went in" for a settlement. He offered me 30s., which I did not want in the way that he tendered it; and he told me that as soon as the "other side" paid he would send round the money. It was a bold stroke, for he knew that I had eaten a good deal of legal salt. That night's post took my letter of inquiry into the country, and the second day brought an answer stating that the compromise and full costs had been paid to my friend some six weeks previously. I sent a copy of that letter to him, mentioning that the Incorporated Law Society might have something to say in the matter. That meant having him struck off the rolls; and ultimately his friends, to their great and lasting regret, persuaded me to accept £5. The regret arose from the fact that he returned to Wales, took ill, and went beyond the reach of all societies and creditors whatever. The moral of the story lies here. I knew how to go to law, and that it was "worth my while;" but my failure was in my having had a bad agent. I knew an inventor, too, who went to law about one of his patents. The trial was a protracted one, and he obtained some seven hundred pounds damages, which were duly paid. Moreover, when he came to settle with his solicitor, what with models and drawings and witnesses, all of an expensive character, he told me that he had only £70 to receive. If that was the fortune of the winner, how must the loser have fared, who had to pay the damages and the winner's costs? And yet here everything was favourable for the plaintiff—the "know how," the "worth while," and the agent. After this little appetizing whet of an introduction, I will now go on with the legal proceedings under the new Act.

In an action for infringement or revocation of a patent, the Court may, if it thinks fit, and shall on the request of either of the parties to the proceeding, call in the aid of an assessor specially qualified, and try and hear the case partially or wholly with his assistance. The action shall be tried without a jury, unless the Court shall otherwise direct. The Court of Appeal or the Judicial Committee of the Privy Council may also call in the aid of an assessor. The remuneration to the assessor is to be paid according to the direction of whatever Court has determined the case, such payment to be in the same manner as the other expenses of the execution of the Act.

In an action for infringement of a patent, the patentee must deliver with his statement of claim, or by order of the Court or the judge at any subsequent time, particulars of the breaches complained of; and the defendant also must deliver with his statement of defence, or by order of the Court or a judge at any time, the particulars of the objections upon which he relies for support. If he disputes the validity of the patent, those particulars must state upon what grounds he disputes it; and if one of the grounds is want of novelty, the time and place of the previous publication or use of what is claimed as novelty, and denied by him, must be also stated. And it must be borne in mind that, unless by leave of the Court, no evidence of infringement will be admitted, of which the particulars have not been so delivered: the judge can give leave for the amendment of any particulars. That ordeal, the taxation of costs, will all turn upon the manner in which the parties have acted in the delivery of particulars; for the judge will not certify for costs to be allowed unless it has been shown that the particulars have been reasonable and proper. The costs here alluded to are the special costs as apart from the general costs of the case. During the trial the judge may, upon the application of either of the parties, make such order for injunction, inspection, or account, and impose such terms and give such directions with respect to what is going on, as he shall see fit. In an action for infringement the Court may certify that the validity of the patent came in question; and if the Court so certifies, then in any subsequent action of the same kind, if the patentee obtains a verdict against the infringer, the latter will have to pay full costs to the former, as between solicitor and client, unless the judge shall otherwise certify; but he is not very likely to do that "otherwise," as he will hold that the second infringer ought to have known about the verdict against the first.

There is now a better remedy than formerly in cases of groundless threats of legal proceedings; the section runs to this effect:—Where any person claiming to be the patentee of an invention, by circulars, advertisements, or otherwise, threatens any other person with any legal proceedings or liability in respect of any alleged manufacture, use, sale, or purchase of the invention, any person or persons aggrieved thereby may bring an action against the patentee, and may obtain an injunction against the continuance of such threats. And if the person who has been threatened has sustained any damage in consequence of the threats, such damage may be recovered, if it can be shown that the articles made and sold were not any infringement whatever. There is a safety-valve for the patentee, however; and that is, that if, after using the threats, he loses no time in commencing an action for infringement of his patent against the threatened party. There is no more settled axiom in law than this, that a person is not allowed to take advantage of his own wrong. In the case under notice it will not do for a patentee, after having an action for damages brought against him in consequence of unfounded threats, to plead that he *thought* that his patent was being infringed. He must, under the new law, look out for himself, and *be sure* that his patent is being pirated before he begins to strike terror into innocent people; he must, in other words, first ascertain if it is "worth while." Ah! and whilst I am writing this paper a somewhat cogent illustration of the "worth while" doctrine has come before me: it is this. The House of Lords has been sitting in its capacity as the final Court of Appeal, and here a few words of explanation may usefully come in.

We often read in the newspapers about the House of Lords sitting in appeal; and it is considered by most people that upon such occasions the members assemble in numbers, much in the same way as upon an ordinary parliamentary occasion. That, however, is not so. Although every member has a right to be present if he chooses, and even to speak and vote, yet for the sake of legal accuracy the appellate jurisdiction of the House is by an arrangement confined to what are called the "law-lords." Those law-lords consist of trained lawyers who have been elevated to the peerage by the favour of the sovereign. When practicable, the House is, upon legal occasions, presided over by the Lord Chancellor as the head of the law. In the case which I am about to relate, the "highest court" of the empire was composed of the Lord Chancellor and Lords Blackburn, Watson, and Fitzgerald. They had to decide upon an appeal from an order of the Court of Appeal reversing a judgment of Mr. Justice Field in a patent case. The plaintiff, a Mr. Moore, was a patentee; and the respondent was a Mr. Bennett, who had been cited for infringing his patent, which was taken out in 1877. And what does the reader think that the patent related to? Why, for improvements in machines for cutting and trimming the hairs and bristles of brushes! It was tried before Mr. Justice Field, who gave judgment in the favour of the patentee. From there the defendant took it to the Court of Appeal, consisting of three judges, who reversed the decision of Mr. Justice Field, after listening to arguments for several days, and dismissed the action against the defendant. The plaintiff-patentee then went to the House of Lords; and there, after more floods of forensic argument, the judgment of the Court of Appeal below was upheld; but no costs were given, as the plaintiff had succeeded upon one point! It takes one's breath away to think of these "nice sharp quillets of the law." Only imagine—to take three courts, eight judges, an array of counsel, and many days' "talkee-talkee" to come to the right side of the improved machine for clipping brush-bristles! There is an old saying of Plautus, a gentleman who wrote about mirth and wisdom a couple of hundred years before Christ; that is just as appropriate now, as if it had only appeared in a newspaper this morning. My readers may have heard of Plautus before, when Polonius is praising the actors to Hamlet,—" Seneca cannot be too heavy, nor Plautus too light." Well, Plautus, through the mouth of one of the characters in his comedies, says—" *Nescis tu quam meticulosa res sit ire ad judicem*"—"You little know what a ticklish thing it is to go to law." And I think that what held good in the time of Plautus is not far from holding good now. The "worth while" business was understood in his days; and with respect to the above action the same understanding will be arrived at when the parties in the cause will have enjoyed the luxury of analysing their respective bills of costs, as each litigant has been adjudged to pay his own.

It is pleasing and soothing to our common feelings of humanity to find that the new Act has not forgotten the lawyers. The thirty-third section is very short, but it is very, very sweet to the palates of the gentlemen of the law. It lays down that there must be a patent for *one invention only*, but it may contain more than one claim. To be sure, there is a kind of saving grace that the patent may contain more than one claim; and it shall not be competent for any person in an action to take any objection to a patent, on the ground that it comprises more than one invention. There seems to be some little contradiction here. The patent is only to be granted for one invention; but having been granted, and should it be afterwards discovered that it has taken in more than one, then upon that discovery no one shall have power to question the patent. Where the lawyers will come in will be in the interpretation of this clause; for it is quite within probability that there will be a divergence of opinion among them upon the subject. Let it be supposed that an inventor patents a new watch in which the escapement, the balance, the springing, the regulating, and the winding are all new. Now each of these arrangements, standing by itself, would be eligible for a patent. Would five patents have to be taken out for them all? In our advertising columns are two patents in operation in connection with watches. There is that of Mr. Russell, of Liverpool, for regulating by the winding-button and semicircular index and hand upon the dial; and that of Mr. Cooper, of Clerkenwell, which winds by a key, but in which the winding mechanism is entirely new, the object being to prevent wrong-way winding, and so strong as to produce the breaking of the key if undue pressure is insisted on. Full descriptions of both these patents have appeared in previous numbers of this journal. Assuming for the sake of the argument that the different inventors had sold and assigned to one person both inventions, and combined them in one watch, would it be necessary, according to the new law, for separate patents to be taken out; or would one patent protect them both? The point is serious, having been made so by this 33rd section with which I am now dealing; but a great deal will depend upon the interpretation that may be given to the section by the law officers, and it will be necessary, in order to prevent litigation, that they shall settle upon a standard of agreement of an equitable character and abide by it. In that 33rd section the words, "but it may contain more than *one claim*," there must have been some literal error in the drafting of that section, short as it is. I have carefully gone over the legal form of the new letters patent, and the word "claim" does not occur in it. We all know that "claims" are set forth in specifications, but that they certainly are not to be found in letters patent. That will be where a common-sense rendering of the meaning will have to be settled.

If a person possessed of an invention should happen to die without making application for a patent, such application may be made by, and letters patent granted to his legal representative. And the application must be made within six months of the death of the proprietor; and the legal representative must send in a declaration, stating that he believes that the deceased person was the first and true inventor of the invention. That section is quite new in patent law; because formerly, if an inventor died before making application for a patent, the right died with him. In the case of his having sold and assigned his invention, of course that was different, as the invention was then the property of another person. When a patent has been granted to the true and first inventor, it shall not be invalidated by an application in fraud of him, or by provisional protection obtained thereon, or by any use or publication of the invention subsequent to that fraudulent application during the period of provisional protection. That is, that if another person shall, after the patent has been granted, make an appltcation or obtain provisional protection for the same subject as the patent, the patent will hold good, and the second applicant will find himself "in trouble." A patentee may now assign his patent to particular places, that is, to any place in or part of the United Kingdom or Isle of Man, as effectively as if the patent were originally granted to extend to that place only. Should a patent be lost or destroyed, and the non-production of it accounted for to the satisfaction of the comptroller, that functionary may at any time cause a duplicate patent to be sealed.

The law officers may examine witnesses on oath and administer oaths for that purpose under this part of the Act, and may from time to time make, alter, and rescind rules regulating references, and appeals to the law officers and the practice and procedure before them under this part of the Act; and in any proceeding before either of the law officers, such officer may order costs to be paid by either party, and any such order may be made a rule of Court. Examining upon oath is very important, and will be found valuable, as it places the witnesses at the risk of the penalties for perjury in the event of their giving false evidence.

(*To be continued.*)

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Correspondence Column.

"WEIGHTS AND MEASURES ACT."

TO THE EDITOR OF THE "WATCHMAKER, JEWELLER, AND SILVERSMITH."

Sir,—Anent the recent prosecutions and fines for illegal and unjust weights, unpleasant as they are to the parties directly concerned, the outcome will be of great advantage to the trade at large, as many jewellers will profit by examples instead of personal experience. The defence set up in several cases, that the weights complained of were not used for buying and selling, but merely for weighing out to the workmen, is not only a very lame excuse, but an entirely inadmissible one. The "Weights and Measures Act," 1878, "was to commence from the 1st of January 1879—more than five years ago. In the beginning, the late Lord Chief Justice admitted that he found it difficult to keep pace with the recent legislation, on account of the sudden and unprepared change of calculating the value of precious metals by the decimal division of an ounce, instead of the old system by dwts. and grains; yet by the admission of the defendants, who are masters, and certainly the leaders and instructors of their workmen and apprentices, they adhered to the old and illegal system, instead of adopting the new and legal and, above all, the greatly improved system, and, by doing so, not only acting in contravention of the law, but at the same time keeping their *employees* from being initiated and accustomed to the standard weights for the precious metals as ordained by Act of Parliament.

Yours truly, H. B.

REFORM.*

TO THE EDITOR OF THE "WATCHMAKER, JEWELLER, AND SILVERSMITH."

Sir,—At last the voice of reform has been listened to, and, without a single dissentient voice in the House of Commons, it has been decided that the duties upon gold and silver plate are eventually to be abolished, together with the licences, and the principle of compulsion as applied to hall-marking. We must now take care that legislation shall be complete; there must be no tinkering of Acts of Parliament. We reformers know what we want, and we will be contented with nothing less than our full demand.

(1) All the old Acts of Parliament, forty in number, must be abolished by Clause 1 of a new Act.

(2) Clause 2 must strictly protect all ancient marks; the word "ancient" to apply to all hall-marks prior to the passing of the Act.

(3) Powers to all existing halls to continue hall-marking upon a voluntary system.

(4) Powers to all corporations to establish halls when and where required.

(5) Powers to halls to ascertain quality of wares by "the touch," as in France and Austria, as well as by the "scrape and parting assay." Finished goods (British or foreign) to be submitted only to "the touch."

(6) No more breaking up of goods pronounced to be lower than the required standard.

(7) No more date-marks, or town-marks.

(8) The "Lion" to be registered as a standard gold and silver mark under the Trades' Marks Acts; "Britannia" likewise. If it be decided still to continue marking gold of 9, 12, and 15 carats fineness, those marks must also be registered, and all makers' marks must be registered.

(9) Unification of charges for hall-marking.

(10) Watch-cases to be marked with metal domes.

There are many other details. For example, the halls at Exeter and Newcastle are not necessary; they should be abolished. Exeter, I believe, is now about to take the initiative in this direction.

I am, Sir, yours obediently,

Pall Mall East. Edward J. Watherston.

Re FACTORY ACTS EXTENSION (SHOPS).

TO THE EDITOR OF THE "WATCHMAKER, JEWELLER, AND SILVERSMITH."

Sir,—This Bill has been closely followed by the Council of the National Traders' League in the interest of all parties concerned. The second reading stood for Wednesday, the 25th, but was not reached; therefore the position of the Bill is that, should all opposition be withdrawn, it can come on at any time, *and be passed.*

In this event the Council is of opinion that the measure as at present drafted would be detrimental to the interests of both Masters and Assistants. It is therefore deemed necessary that a public meeting be convened at an early date in London, in order that the hands of the Council may be strengthened by having an expression of opinion from Masters and Assistants upon the subject, which has not yet been done, and with the further object of placing their views by way of deputation in the hands of Sir John Lubbock and other Members of the House.

May I therefore ask you to insert this letter in your valuable journal, so that the question may come before your readers, who it is hoped will forward their views to me, if possible, before Wednesday, the 2nd prox., on which day the Council will meet and arrange for the proposed public meeting.

Your obedient Servant,

National Traders' League, J. W. Tait, Secretary.
27, Leadenhall St., E.C., 26 June, 1884.

WATCHMAKER'S GRIEVANCES.

TO THE EDITOR OF THE "WATCHMAKER, JEWELLER, AND SILVERSMITH."

Sir,—We frequently see in your valuable pages watchmakers and watch-repairers stating their grievances and suggesting remedies for them, and I think all the readers of this journal will agree with me that no better use can be made of your valuable pages than this. If you will allow me the space, I should like to give my view of the question, as far as the watch-repairer or country watchmaker is concerned. Now the proper repair of a good watch, the discovering of faults and rectifying same, the replacing of broken parts, etc., requires an amount of technical knowledge (theoretical and practical) superior to that required by one who has a rough movement put into his hand to "finish" *i. e.,* the watch*maker*. The repairer, in order that he may do his work well, must have a thorough knowledge of general mechanics; he should study well such works as "Saunier's Horology," and such articles as appear in this and kindred journals from time to time. After he has so studied and practised his art so as to carry all theoretical conditions into effect—after years of such study and practice, he will have acquired none too much knowledge for the thorough repair of the various time-keeping machines that come into his hands for that purpose; he will still find plenty of room for improvement. Take such an apparently simple repair as the replacement of a broken mainspring; how often do we see good watches injured to a considerable extent by the introduction of a spring too strong for the purpose. Bursting of the barrel, wearing and binding of the great wheel teeth, and other evils resulting from an error that is every day committed by such abominable cobblers as are a disgrace to the trade; and yet I suppose there is not one out of a hundred of those who profess to repair watches that can calculate the strength of spring required. I need not enumerate the many, very many other blunders committed on good watches by such workmen; they are only too well known to all concerned. It is high time that we, who have a regard for good work and who wish to keep our trade above the level of that of the man who mends holes in tin kettles, should possess some means of showing the public who are really capable of repairing their watches, and that our trade demands an amount of scientific and technical knowledge which all require, but few possess. If we can by any means succeed in doing this, we shall thereby raise ourselves to that position in society which our trade at one time in its history enjoyed; but if we are still content to go on as we have for some time, we deserve all the ignominy that attaches to our profession. Wherein is the remedy? I think the answer is simple. There should be the same destinction between skilful and unskilful members of our trade as there is between that of a doctor holding a diploma and a quack. "Chronos" (page 132) suggests that every one, before being allowed to practise, should be compelled to pass an examination. I quite approve of the examination; but if we wait for an Act of Parliament to compel it, we shall never get it. The matter is not one of life and death, being only the destruction or preservation of a fair piece of mechanism. There should be examinations and every facility offered to those who wish to obtain certificates. I doubt not that a great many would willingly work up for examination, if they could only be persuaded of the good results that would most certainly follow. This matter, then, should be set before every member of the trade. What is now being done in London, at the Horological Institute, should be extended to provincial town as centres for the surrounding districts. This is a matter that would involve the expenditure of an enormous sum of money, and we cannot expect it to be done at once; it is a matter of time and work. In the meantime I should like to direct the attention of all engaged in our trade to the technological examinations of the City and Guilds of London

Institute. The examinations in "watch and clock making" under the auspices of that most excellent institution, are within the reach of all, there being a committee in almost every town in the kingdom in connection with the "Science and Art" department, who are also qualified to hold those examinations. Already a few have availed themselves of the City and Guilds examinations, and have thereby greatly improved themselves, and done much toward becoming good tradesmen. The certificate obtained may be hung up in the shop, or placed in the window, if thought proper, to show the public that such persons are honestly endeavouring to do good work. Of the practical good that a City and Guilds certificate can be I am in a position to bear personal testimony. Since I obtained one, my trade has increased; customers have more confidence in me; I can do my work with greater care and despatch, and my charges are paid without grumbling. I mention this as an encouragement to others. The examination is not a practical one, but those who "go in" for it will be surprised with what additional comfort they proceed with their work, and that the practice necessary to become a good workman comes naturally as a pleasure.

When the watch-wearing public find out that there are certificated and uncertificated watchmakers, they will look out for those who, as they rightly judge, would be capable of repairing their watches. Good watches would then cease to be "botched," and reduced to the quality of the rubbish that are now sold in such abundance. The purchase and manufacture of good work would then be encouraged, and that of the dreadful stuff now sold discouraged. We must not wait for the "trade" as a whole to move in the matter; it must be done by the few. Those who are unwilling will speedily find themselves compelled to follow, by their trade slipping out of their hands.

That something should be done in the matter, and commenced at once, and that others should give their attention and pen to the subject, is the earnest wish of

Yours truly,

Liskeard, 15th June, 1884. W. H. Huddy.

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Musical Boxes.

A Glance at their Manufacture at St. Croix, Switzerland.

> The man that hath no music in himself,
> Nor is not moved with the concord of sweet sounds,
> Is fit for treasons, stratagems, and spoils;
> And the motions of his spirit are dull as night,
> And his affections dark as Erebus.
> Let no such man be trusted.
>
> Shakespeare, *Merchant of Venice*, *Act V.*, *Sc.* 1.

JUST at this sultry season of the year, when there is little that invites us to linger in our streets, and we are disposed to seek for health and recreation, we are often troubled with such questions as these: Where shall we go? and how shall we best occupy ourselves during the short interval in which it is our desire mainly to seek for health, and to renew our energies for business? Doubtless many of the readers of this Journal, who are prepared to spend about twenty-five pounds on their summer trip, will best consult their interests by taking a trip to dear old Switzerland.

It is often observable in the writings and speeches of public men, especially those who have been successful in commercial enterprise, that these annual excursions have not only been conducive to health, but during their sojourn they have in a marvellous degree, not only increased their stock of information, which in the end has abundantly repaid their outlay, but also made themselves richer, wiser, and therefore better men. As they travel on their journey they not only get *exhilaration*, but, better still, an *inspiration*, which lays the foundation of their increased capacity for usefulness.

Standing on the platform of the railway station at Lausanne (Second-class return ticket from London to Lausanne viâ Dieppe, £5 16s.) on a fine summer's morning last year, I determined to turn my back on its dales and valleys, in which I had certainly got exhilaration, and try to climb the mountain and breathe its inspiring atmosphere.

> "In the dell . . . . there is a world of beauty and delight."

In a few minutes I arrived at Yverdon and thence by coach, a delightful journey of three hours, among rocks and hills, we arrived at St. Croix, the seat of the Musical Box industry. It stands about 3,500 feet above the level of the sea, and commands a range of nearly two hundred miles of magnificent scenery, including some splendid views of the Alps. It contains about 4,000 inhabitants. Its buildings are large, not handsome. Its urgent wants are a railway, and a good supply of water.

I soon discovered that Musical Boxes are largely manufactured, on what we call in England the Cottage system, *i.e.* small pieces of work are made by little masters in their own homes. There is, however, one exception to this rule, viz., that of Messrs. Paillard and Co., whose extensive factory is situated in the west end of the town. The relative merits of these two systems of manufacture has often been a topic in the pages of this Journal; and while I hold very decided views as to the advantages of the factory system, I have no intention of enlarging upon their relative merits, as facts will presently speak for themselves.

About six years ago I recollect to have met the proprietor of this establishment in London, in company with two other Swiss manufacturers, forming a commission, and sent here to inquire into the probable causes of the falling-off and threatened decay of certain Swiss industries; and I had only to remind him of his interrogatories upon the occasion referred to, in order to gain his confidence and obtain permission to view his extensive workshops.

After this friendly greeting, and a little much-needed refreshment, he proceeded to explain that the factory had been built about three years, and contained all the most recently improved tools, made by a special engineer in their own factory, and that working with this machinery, they were now enabled to produce work, *ad libitum*, and at least twenty-five per cent. better in quality than when working on the old system. There were no longer complaints of slackness, falling-off, and threatened decay, but with an increased staff of two hundred hands, they were working at full time. Shall I live to record such a fact of the watch and clock trades of Clerkenwell?

I was first taken into the show-room of instruments that were complete. The first Musical Box I examined had some special features well worthy of notice. Among others I may mention the size. It was unusually large: height, 4 ft.; length, 4 ft. 4 in.; breadth, 2 ft. 4 in. The style is that known as Louis XVI., which aims more at grandeur than solidity; there is a lightness and a delicacy in the design which makes it specially suited to the drawing-room. It was made of ebonised Spanish mahogany, profusely inlaid with figures of brass, ivory, and mother-of-pearl, all of which were exquisitely engraved. The edges, escutcheons, feet, etc. were of solid cast brass, richly chased and water-gilt, and finally covered with a thin transparent lacquer, which effectually prevents tarnish. The workmanship and beauty of finish were of the highest possible order, and it would be no exaggeration to say it would grace the best room in Marlborough House or Windsor Castle; but its chief glory is its music. I can feel its wondrous and ennobling power, and yet my pen is paralysed and powerless when I try to describe it. It commenced by playing a simple yet plaintive air, and it produced a peculiar lingering effect, similar to a band of music that is travelling, and eventually the tune is lost in the distance.

> Where music dwells
> Lingering, and wandering on as loth to die,
> Like thoughts whose very sweetness yieldeth proof
> That they were born for immortality.
> Wordsworth.

And just when I thought the performance had ended, it suddenly burst forth with a volley of sweet thunder, and for the moment I feared some of the machinery had given way, and the energy of the four great mainsprings that were driving it was about to work speedy destruction, but was soon reassured and again enraptured by the grand chorus, which gradually became lower, and then lingered, and at last died away; and I listened, and listened, hoping to hear a repetition of the sublime harmony.

The playing this air occupied about fourteen minutes, without any cessation, and this brings me to consider a new feature in musical boxes, the introduction of which is due to Messrs. Paillard and Co. An ordinary box with the largest cylinder made, diameter 16 lines, or 3½ ins., playing at slow time, occupies about one minute and eight seconds to play each air.

Next month I will explain by diagrams the improved mechanism.

(*To be continued.*)

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The "Hall-Marking Question" in Germany.

WHATEVER may be said against the system as "by law established" in England, in reference to transactions with gold and silver articles, it seems that a system "not by law established" is equally far from the "Arabia Felix" of honest traffickers in such wares, however much it may suit those that belong to the "but get money" persuasion. Thus far the Germans have not been hampered by any compulsory laws as to the standard of gold or silver in watch-cases, yet they (the watchmakers), as with one voice, implore the Reichstag for a remedy of the evils resulting therefrom, which they think would be obtained by some such law as a section of the English "pivoting community" think is the worm at the core of their prosperity. Evidently the Germans have tasted a pudding similar, or like one, that the English propose cooking, and they are now having, at their urgent request, a draught prepared to purge them of the effect. It may therefore be instructive to give heed to a few of the pains they complain of as a warning against getting into the same difficulty.

"Like all others who are trading in precious metals in Germany, the watchmakers are suffering, and in an especial manner, from the want of State control of gold and silver wares." *

Thus reads the introduction of their petition. It is a sweeping statement, and one that is the fruit of experience. "Just the very opposite to what we expected," say some: "how can these things be?" But this statement does not yet deal with the whole of the disease, for it appears to them hydra-rooted, affecting not only the "horological stomach" of Germany, but almost the whole body, in a most startling manner.

"It may not be known to the high court of the 'Reichstag' what magnitude the conditions and what extent the evil has assumed, so that a speedy remedy is urgently needed, not only in the interest of our trade, but in the interest of national morality."

If this is true, then the morality of Germany must be "sick unto death," for unless German "horological morals" are on the whole of a much better colour than most of the specimens at hand, it is hardly to be expected to receive the note of alarm from such a quarter, for it seems as the cry of one in distress over the infection he himself is spreading.

Having given this "general note," they enumerate or particularize the causes against which they wish to petition.

"That gold watches are made abroad, especially in Switzerland, the standard value of which defies definition, is a universally known fact. For years watches have been imported into Germany and sold as of 14 or 18 carat, which fall considerably short of this value. The ease with which this profitable trade could be practised, the difficulty of its detection, and the absence of legal control, acted as factors for its increase. It gradually became an organized swindle, the like of which it would be difficult to find in any other trade. The standard or virtual value of cases fell more and more short of the declared or stamped value, till it is not an uncommon thing to find watch cases marked '14 carat,' which are scarcely 7 carats."

This certainly reveals a sad state of things, and the question may be asked, Is it confined to Germany? Are all the cases of Geneva watches imported into England really what the stamp on them declares them to be?—or is this the secret of the "wonders of cheapness" with which some of the "cheap watchmakers" startle the public? If so, then it is evident, by the case before us, that it would be folly to abolish law, for here it has been tried until matters have degenerated into a "horological Sodom."

Deploring and blushing for such a state of affairs, our brethren in the craft refer to their own private efforts to check this destructive tide, but, finding them unavailing, they confess themselves compelled to seek the protection of the strong arm of the State.

"It is true," say they further, "that the law, which came into operation on the 1st of January, 1882, in Switzerland, in relation to the standard of gold and silver articles, promises an improvement of these conditions. The time is, however, too short to judge of the result. But though this new law provides the guarantee that all cases carrying the stamp of the Swiss Confederation are of the standard declared to be, viz., 14 or 18 carat, it in no way prohibits the manufacture and export of inferior articles, and thus Germany is flooded as much as ever with fraudulently manufactured articles."

This concludes the negative side of their case, and now comes their suggestions for a remedy.

"We can only hope for a remedy of these evils from the Imperial Government" (a significant admission), "and pray the High Court of the 'Reichstag,' most humbly, graciously to institute a legal control, with a provision that in Germany watches of 14 and 18 carat gold cases only may be manufactured and sold, and that all must be assayed and stamped, and further that only 14 or 18 carat gold watches should be permitted to be imported, and if the cases of watches imported are not legally stamped with that of the Swiss or some other Government they shall be subject to be tested and stamped with the stamp of the Imperial Government."

What will the advocates of the "voluntary system" think of the German mode of thinking on this matter?

There appears one great point gained if it comes into law, viz., the uniformity of the measure.

The term "gold" means but one thing with many people: they do not know the difference between 7 or 22 carats, and it is with such that gold watches at marvellously low prices become the bait. It appears, therefore, evidently desirable that the ambiguity of this term should be removed as a protection of the public against fraudulent dealers. Likewise it appears necessary to look after the export trade. It must do the Swiss watch trade harm in the long run if fraudulent articles are permitted to cross her frontiers, just as the English trade has suffered from the effect of English watches put in metal gilt cases, engraved 18 carat, and sent into the South American markets as English gold watches.

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* [What does Mr. Watherston say to this?—Ed.]

Law of course can do much to check fraud; but the checking is often only forcing it into new channels, and hence when we think an evil is suppressed it breaks forth at an unsuspected point; but, though this is so, to make no effort at all would be investing license with liberty. Law can never establish a millennium anywhere; but love of law and truth can, and therefore the true remedy must be sought in principle rather than in a legal provision.

In this sense there appears one hopeful and instructive sign in connection with this matter. It is scarcely possible that the general conditions of the watch trade can very well become worse than they were in Germany. The skilled workman-watchmaker was completely at a disadvantage, and could only take refuge in doubtful practices to compete on equal grounds with unscrupulous opponents, until every method seemed worn out, and all found themselves in a common vortex of depression. Then they became resolved to look things in the face, and arrived at the conclusion that the only remedy can be in real and genuine dealing with the public. This was setting their faces in a new and right direction, and the petition against the evils complained of marks simply a point on their onward march. Low prices in a trade finds no cure in subterfuges; they simply multiply the necessity for new ones, ending at last in moral chaos. Such "by-paths" always have led trades to ruin, and always will: if a trade has no chance of success by relying on truth, it has none by any other method. It would, however, be wrong to credit the German watch trade with the guilt of the evil against which they cry out. It is due to a class of men found everywhere, whose principle is "no principle," and who know no crime except being found out. We will notice again if the law they desire will protect them from these vultures.—[J. H.]

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Extracts from the Report of the Astronomer Royal.

THE present report refers to the period of twelve months from May 21st, 1883, to May 20th, 1884, and exhibits the state of the Observatory on the last-named day.

Buildings and Grounds, Moveable Property, and Library.—The new dome for the Lassell telescope was completed by Messrs. T. Cooke and Sons, at the end of last March, and is in every respect satisfactory. It is 30 feet in diameter, covered with papier mâché on an iron framework, and turns with great ease. The shutter-opening extends from beyond the zenith to the horizon, and is closed by a single curved shutter (3 ft. 6 in. wide at the zenith and 6 feet wide at the horizon), which turns about a point in the dome-curb opposite to the shutter-opening, and runs on guiding rails at the horizon and near the zenith, the curved shutter being continued by an open framework to complete the semi-circle. This arrangement appears to leave nothing to be desired as regards ease of manipulation. After the completion of the dome, the carpenters' work on the flooring, etc., of the building, and the attachment of the observing stage (which is fixed to the dome) have necessarily occupied much time, and the building is hardly yet complete in all details.

Under the supervision of the Director of Works of the Admiralty, extensive improvements have been made in the arrangements for the drainage of the Observatory, and preparations have been made for connecting it with the main drainage system. Several rooms in the Observatory Buildings have been painted during the past year.

The only addition to the moveable property, which calls for notice, is the new photograph-micrometer. The instruments lent to the transit of Venus Committee have all been returned, with the exception of a clock (Dent 1915) which has been sold to the Natal Observatory, and of the instruments lost in the wreck of the "City of Brussels." A 6-inch equatorial by T. Cooke and Sons has been transferred to the Observatory by the Transit of Venus Committee, with the sanction of the Treasury, to replace the Naylor equatorial. Of the instruments purchased for the Transit of Venus, 1874, there are now at the Observatory two transits, two altazimuths, five 6-inch equatorials, and two photoheliographs, one of which is mounted for daily use. Three transits, an altazimuth, and a photoheliograph are at the Cape; one photoheliograph and the mounting of another are at South Kensington, and a photoheliograph tube is in India. An altazimuth has been lent to the Observatory of the Royal Naval College, and the 6-inch object-glass of the Hodgson equatorial has been temporarily lent to the Experimental Light Committee of the Trinity House. The two 4-inch telescopes lent to Captain Wharton, R.N., have been returned.

The annual comparison of the books and manuscripts in the Library with the catalogue is now being made.

Astronomical Observations.—*Transit-Circle.*—There is no change of importance to notice in this instrument, which has been kept in good working order. A reversion-prism for use with the collimators as well as with the transit-circle is being made by Messrs. Throughton and Simms. The sun, moon, planets, and fundamental stars have been regularly observed throughout the year, together with other stars, from a working catalogue of 2,600 stars, comprising all stars down to the sixth magnitude inclusive which have not been observed since 1860. Considerable progress has been made in obtaining the requisite three observations of each star, and there is a good prospect that by the end of next year, when it is proposed to form a new nine-year catalogue, the whole of the stars will be cleared off. The annual catalogue of stars observed in 1883 contains about 1,550 stars.

Chronometers and Time Signals.—The number of chronometers now being tested at the Observatory is 192, and of these 155 (115 box-chronometers, 17 pocket-chronometers, and 23 deck-watches) belong to the Navy, 33 are placed here for the annual competitive trial, and 4 are on trial for purchase by the Austrian Government.

The first six chronometers in the competitive trial of 1883 were slightly above the average of recent years as inferred from the trial numbers.

No failure in the automatic drop of the Greenwich time-ball has occurred during the year to which this report refers. The ball was not raised on two days on account of the violence of the wind, and on four other days during the repair of the machinery.

As regards the Deal time-ball, after various delays, the arrangement referred to in the last report, for sending a current to Deal and receiving a return-signal through the Chronopher of the Post Office telegraphs, was brought into operation on February 29th, and has worked well since. The change has necessitated some slight alteration in our arrangements, in order that we may be able to receive the Westminster signal through the same wire which is now used for the Deal current and its return-signal. There have been 16 cases of failure in the dropping of the Deal time-ball, owing to interruption of the telegraphic connections, 12 under the old system, and 4 since the new arrangement with the Post Office. On 19 days the current was weak, and required the assistance of the attendant to release the trigger, and on 9 days the violence of the wind made it imprudent to raise the ball.

The errors of the Westminster Clock have been under 1^s on 53 per cent of the days of observation, between 1^s and 2^s on 30 per cent., between 2^s and 3^s on 13 per cent., between 3^s and 4^s on 3 per cent., and between 4^s and 5^s on 1 per cent.

Clocks and Chronograph.—The mean solar clock, made many years ago by Shepherd and Son, has on several occasions in the past year stopped through failure in the electric contact made by the pendulum. Mr. Shepherd has proposed an improved form of electric escapement, which he has fitted to a pendulum to be placed here for experiment within the next week. Meanwhile, in order to avoid the inconvenience caused by the stopping of the mean solar clock, which sends out the hourly time-signals to the Post Office for general distribution, one of the transit of Venus clocks (Dent 2012) has been fitted by Messrs. E. Dent and Co., with the requisite contact springs, so that it can be used at any time in place of the electric mean solar clock, and a relay adapted for driving the sympathetic clocks by means of the clock Dent 2012 is being made.

Meteorological Observations.—The mean temperature of the year 1883 was $49^{\circ}\cdot3$, being $0^{\circ}\cdot4$ lower than the average. The highest air temperature was $85^{\circ}\cdot1$ on August 21st, and the lowest $20^{\circ}\cdot6$ on March 24th. The mean monthly temperature was above the average in January and February, and below in March and July. In the other months it differed little from the average.

The mean daily motion of the air in 1883 was 291 miles, being 12 miles greater than the average. The greatest daily motion was 842 miles on December 12th, and the least 62 miles on December 26th. The pressures exceeding 20 lbs. in 1883 were 28·0 lbs. on January 27th, 28·5 lbs. on February 2nd, 24·4 lbs. on March 6th, 20·5 lbs. on October 17th, and 26·5 lbs on December 12th.

During the year 1883 Osler's anemometer showed an excess of 16 revolutions of the vane in the positive direction N, E, S, W, N, if all the turnings are counted; or of 19 revolutions in the positive direction if the turnings which are evidently accidental are excluded.

The number of hours of bright sunshine recorded by Campbell's sunshine instrument during 1883 was 1,241, which is about 30 hours above the average of the six preceding years. The aggregate number of hours during which the sun was above the horizon was 4,454, so that the mean proportion of sunshine for the year was 0·280, constant sunshine being represented by 1.

The rainfall in 1883 was 21·9 inches, being about 3 inches below the average.

Tracings of the barometer registers for the days following the Krakatoa eruption have been sent to Mr. R. H. Scott and to M. Paul Schreiber. Two series of atmospheric disturbances recurring at intervals of about 36 hours are recorded from August 27 to September 1.

We remarked no definite connection between magnetic or electrical disturbances and the phenomena of the remarkable sunsets of the past winter.

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The preparation of the particulars of magnetic movements and of the plates for disturbed days has pressed somewhat heavily on the Magnetic and Meteorological department, but I trust that the facilities thus afforded for comparing magnetic and solar phenomena will be appreciated, and in ordinary years the labour involved will be very much less. I regret that this work has compelled me to postpone for a short time, amongst other things, the completion of the Meteorological Reductions to which I referred in the last Report.

W. H. M. Christie.

Royal Observatory, Greenwich.

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Trade Notes.

A Legal Tender of Money.—At the Spalding County Court, A. T. Simpson sued Mrs. Goss for the sum of £3 7s. 6d. Defendant paid the amount into court, and said she had previously tendered the money, which plaintiff refused to accept. She called upon Mr. Simpson and offered a £5 note, but he said the case was out of his hands and she must go to his solicitor. Mrs. Goss thereupon proceeded to the office of the solicitor, and offered the money to a clerk, who refused to accept it unless an additional sum of 4s. was paid also, being the fee for a letter sent to her. Plaintiff's advocate argued that it was necessary for the money to be shown to plaintiff, and even if that were proved it was no legal tender if the amount offered exceeded that required. His Honour said if plaintiff had refused to accept the amount offered (being more than required), stating as his reason that change must be given, then the tender was not legal; but as he had stated no such objection it would be legal. A verdict was given for defendant.

Dr. Hirsch, the Director of the Neuchatel Observatory, in his report for 1883, says that in no previous year have so many watches or "chronometers" been received, or so many certificates given. In 1882 the number of watches was 306, but this rose to 503 in 1883, of which 383, or 76 per cent., have received certificates. Since the last five years the number of watches which have passed through the Observatory has more than tripled. Dr. Hirsch regards this not only as an exhilarating sign of the happy prosperity of the horological industry in Neuchâtel, but also as a proof that the value of Observatory certificates is more and more appreciated by the manufacturers as well as by the public.

As an instance of the manner in which these certificates are used commercially, we may mention that at the Loan Exhibition of scientific instruments, held at South Kensington in 1876, six adjusted watches were exhibited by Mr. Ekegren, of Geneva, which were described in the catalogue as having "rates from the Geneva Observatory." It simply amounted to this—that at a certain time, and under certain conditions, the watches performed in the manner stated on the rate-papers. Whether they would have done the same had they been taken out of the show-case and placed in the pocket after lying by for six months, could only be ascertained by actual experiment, but we suspect that the purchasers of "certificated" watches require as much, if not more management than those who are satisfied with the word and reputation of the seller.

We have written the preceding paragraph because we believe that only a few watches have been sent to the Kew Observatory at present. This must not be regarded as a proof of the inertness of the trade, but rather that a difficulty is felt in adapting the certificate system to our present mode of conducting business. It is more suitable for large manufacturing retailers and co-operative associations, who can send a considerable number of watches in a complete state, and sell them with their own names on, exactly in the condition that they left the Observatory. Our original impression was that the trials were to be competitive, and we hope that when the commercial part proves a success, such trials will be organised, and the results published.

The sixth annual Exhibition of the Polytechnic Young Men's Christian Institute was opened by the Lord Mayor on the 24th ult. We have not been able to visit it this year, but note that no horological exhibits are described in the catalogue. The list of practical classes does not include one for watch and clock making, although theoretical instruction is very ably given by Mr. Herrmann.

A bi-monthly contemporary has done us the honour of reproducing the concluding part of our translation of an article on the manufacture of repeating watches which originally appeared in the *Journal Suisse d'Horologerie* only in the hurry of cutting it from our columns, the editor has apparently not noticed that part of it is original, and did not appear in the journal which he has alone seen fit to acknowledge. It is not long since that a New York editor made a similar complaint, but in much more forcible terms. Other horological journals also appropriate our ideas from time to time, and are equally forgetful of their source, we are however, consoled by knowing that their readers are aware of it.

We learn by private advices from Chicago that business is picking up, sales being heavier although prices still remain low. It is pleasant to be able to record anything of an encouraging nature at the present time.

The third ordinary general meeting of the English Watch Company (Limited) was held at the Grand Hotel, Colmore Row, Birmingham, on the 5th ult., when a dividend was declared at the rate of 6 per cent. per annum, free of income tax, on the paid-up capital of the Company, absorbing £1,054 8s. 7d. £50 was awarded to the Directors as an honorarium for their services, and £500 carried to a reserve account, leaving a balance of £82 15s. 3d. to be carried forward. The general position of the Company was considered satisfactory, and an appeal made for further capital with a view to the extension of its operations.

We are compelled to hold over the continuance of several articles this month owing to unusual pressure on our space.

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Queries and Replies.

Perhaps the information in the July number of the Watchmaker Jeweller and Silversmith may not be sufficient for "Acid." He does not say what quality the gold is he wishes to dissolve. If eighteen-carat or above, aqua-regia (one part nitric acid, two of hydrochloric) is employed. It should be heated in order to facilitate chemical action. If of fifteen-carat, or less quality, an equal weight of silver should be added, thoroughly melted together, poured from a height into water to granulate, then treated with nitric acid one part, water two; this will dissolve all the alloy, leaving the gold as a black spongy mass, which may be melted in a crucible with a little potash or soda for flux. To recover gold that has been dissolved in aqua-regia, take two ounces of protosulphate of iron, and dissolve in sixteen ounces of hot water. This should be added to the gold solution until no further precipitation of gold takes place: no more must be added than is essential. The precipitate may then be melted in a crucible same as the last. Any further information may be obtained of W. H. Huddy.

Resilvering Clock Dials.—Dissolve some silver in nitric acid one part, water three parts; add to the solution some water, in which has been dissolved common salt; this will throw down the silver as chloride. Take the chloride of silver thus obtained, and add to it three times its weight (when dried) of washing-soda and one and a half times its weight of common salt; mix with water to the consistency of cream. The dial must be thoroughly and chemically cleaned, then the mixture rubbed on with a pad or cork untill the desired result is obtained. Wash off with hot water, and varnish with photographer's clear varnish. If wished, I will give method of making varnish.—[W. H. Huddy.]

P.S.—With regard to those queries I should like to say, if persons would only invest a few shillings in books, the money so spsnt would return a-hundredfold. I should be pleased to enlarge on my answers of those queries, if desired.

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Engraving.

(*From the "American Horological Journal."*)

No art is of higher antiquity, with the exception of the making of pottery, and even then it must have been used in embellishing those humble yet useful articles of fabrication. In fact, we can scarcely conceive of a time when engraving in some form or other was not done. The Indian, who ornamented his pipe, had a rudimentary idea of the art; and long anterior to the Pharaohs engraved tablets of hieroglyphics were made, and found, thousands of years after, still legible, and under the scrutiny of men like Rawlinson have been compelled to yield up their meaning.

After the engraving on stone, we would naturally expect that carved work would follow; and the expectation is fully realised. There are many species of engraving, the general acceptance of the term being, however, a cut in character on a surface from which a print can be taken. Undoubtedly wood was the first substance used on which to engrave for the purpose of printing, as we are assured that the block-printing of the Chinese has been in existence some thousands of years before the present epoch; but in wood engraving the subject is made in relief, or in some cases only the design is cut out, and the subject will then be represented by white lines, the face of the wood taking and impressing the ink from its whole surface.

As the watch repairer has but little in common with the wood-cutting, we will confine ourselves entirely to the metals. We do not hope to teach any one the tact of hand and the artistic taste that are requisite to the production of a good engraving; but there are many things of a general nature that are of interest in the manipulations of the engraver on a piece of work, whether it be for printing or ornamentation. Thus, the repairer who sells goods is frequently called on to engrave the goods sold; and if he is desirous of doing the work well, he must make the engraving on each article the exact counterpart of any of the others. To do this correctly and surely, he must use the process of transfer, and as this is one of the important elements in engraving, we shall not hesitate to describe it minutely, whether the work is intended for printing, ornamentation, or lettering.

In the first place we will take up steel-plate engraving. In this process the base of all the subsequent operations is a steel plate about one-quarter of an inch thick, the face of which, after being brought to as perfect a level and as uniform as possible, is decarbonised, leaving it, in fact, nothing but pure soft iron. It will be seen from what follows that this surface should be not only uniform on the face, but in the evenness of the texture of the metal. After decarbonising, the surface is finished up with a high polish in such a way that it is left in the safest condition possible. This plate, so prepared, passes to the hands of the engraver, whose first work is to copy the design or subject on a piece of gelatine sheet, which is then laid on the design, and fastened by wetting the corners of the gelatine sheet.

The artist is now prepared to copy the design, which he does by means of a sharp-pointed stylus; this produces an outline of all the important parts of the design, and this outline is cut in the surface of the gelatine. On being removed, the whole surface is rubbed over with finely powdered chalk or vermilion; the colour is immaterial, so long as it will make a contrast with the ground on which the transfer is to be taken. The surface is now carefully wiped off, leaving the colours in the cut lines only. The next step is to cover the steel plate with a solution of asphaltum in turpentine, and this is done by means of a ball made by covering a quantity of wool or cotton with glove-leather, and the edges of the leather are brought together at the top of the ball; the superfluous material forms a handle, by which to manage the ball when in use.

The plate is now thoroughly cleaned with alcohol in order to remove every trace of extraneous matter, such as grease, etc. The ball is now lightly dipped in the asphaltum mixture, and then dabbed on the surface of the plate; of course the asphaltum will adhere to the surface, and if care is taken a perfectly uniform surface will be the result. As the turpentine evaporates, a thin film of the asphaltum is left on the plate; and one great advantage in using this article for the ground is, that while it is firm and unyielding when cut, it possesses sufficient tenacity to prevent any raggedness to the edges of a line that may be cut through it to the plate. This uniform coating or ground has a tacky feel, and when the gelatine is reversed and applied to the ground, and gently rubbed on the back with a burnisher, the adhesive ground takes out the colouring matters from the tracing, and when the tracing is removed from the plate a complete outline of the original design is seen on the ground.

The engraver now, with a point, cuts through the ground, following the lines, being sure to reach the steel at every point. As yet he has not made any impression on the plate; to do this he builds up a small wall around the edges of the plate with beeswax; when this is effected he pours on the traced surface some nitric acid, observing closely the effect. A series of bubbles will be observed to arise from every point of the lines; and when the action has been continued long enough to produce the effect desired by the artist, the acid is poured off, and the whole well washed with water to remove every trace of acid. The ground is now washed off with turpentine, the plate cleaned, and the engraver has before him a perfect outline of the original, only reversed. These lines are bitten in the steel, and this whole operation is called etching. In all the subsequent stages this process is the most important, and the skilful engraver manages to produce both light and heavy lines to represent the various lights and shades in the original. We will give only one example of the way the line may be rebitten. A new ground is carefully put on the surface over the whole picture; the very gentle pressure used enables the ground to take on only the plain surfaces of the plate, while the lines are left exposed. The artist, having determined the part he wishes to rebite, stops out all the rest with the asphaltum varnish; the same etching process is now gone through with the lines that are exposed, and, according to his judgment, the action is stopped when the best effect has been produced. The operations are necessarily tedious, for they involve constant washings, and then on inspection the artist picks up any little faults with his graver. In putting in all the various parts of tho design, recourse is had to etching, interlarded with patient touchings up with the graver. In the course of engraving a large picture, this process is repeated many times. The final effect of course depends on the skill of the artist, his taste, genius, and comprehension of the subject.

One great difficulty encountered arises from the tendency of the acid to bite the sides as well as the bottom; in fact the action might be continued so long that the etched line would be too wide, and thus spoil the effect intended to be attained. Consequently the artist watches with jealous care and anxiety the action. There is another mode of engraving on steel that applies more particularly to bank-note work, which work has been carried to a very high degree of perfection, far beyond anything in foreign countries. In this class of work the etching process has no place. The beautiful ovals that are found on the note are called die work; and the die work need not be confined to the oval, but may take any form that is geometrical. On inspecting this die work with a glass of considerable magnifying power, it will be found to consist entirely of lines always concentric, and sometimes parallel to each other in every part; but the general direction of the different lines may be such as to produce a beautiful reticulated appearance. Indeed, every variety of effect can be produced. This species of engraving is done by machinery, the geometric lathe being the first agent used. Now, as this tool is one of the highest products of human genius, and at the same time involves some of the principles of the rose engine, a general description of its construction and its action will not be amiss.

A lathe-head, with its mandrel admirably fitted, is put on the bed of the lathe, and is so adjusted as to be capable of a slight side motion; the tool, which is of the hardest steel, or more preferably of diamond, faces the chuck as in all lathes. Now it is evident that if the lathe-head, with its mandrel, should be moving sideways during a revolution, and the tool remain a fixed point, the line traced by the tool would not be the true circle, but it would had the mandrel remained *in situ* during the revolution. Any arbitrary movement could produce an irregular figure, having no symmetry, and therefore not desired. Now, the question to be considered is rendered free from all complexity if we assume the revolution and side motion to be in some proportion definite and absolute. If the tool remains a fixed point, and the mandrel was moved backward and forward, the line described by a fixed point would not be a true circle; and, to illustrate, we will assume that previous to any lateral motion a single revolution had been given with the point of the tool pressed against the face of the object on the chuck, we should have a true circle. If, now, by any positive mechanical motion we should give the mandrel a gradual advance to the front of the lathe-bed, we should find that the line fell veoy gradually within the circle, and on the return of the mandrel to its original position the line would have as gradually approximated until it met the circle; this would be done in the half-revolution. The other half of the revolution is effected in the same manner, and the new line described would be an ellipse, whose major axis is exactly equal to the diameter of the primitive circle, and the minor axis is less by double the amount of motion given to the mandrel.

We have thus the oval, and its amount of ellipticity is determined entirely by the amount of motion. Suppose, however, that during the revolution the mandrel is moved eight times, we should have a figure that would show four departures from the original circle; and the principle may be carried out to any extent, say even one hundred times, and then the original would represent only a waved line. If, during the time of drawing the oval, the rest should be allowed any number of side motions, backward and forward, it is evident that, in proportion to the number of such motions, the line would appear as a series of waves, small or great, as the case might be. If now the cross feed-screw of the rest should be made to take one turn, or a fractional part of a turn, the next revolution would furnish a smaller or larger waved line exactly corresponding to the first; but in this case the starting-point for the second line must be in the radial line of the first. It will appear plain that the height of the small curves, constituting what we have designated waves, will depend on the extent of motion given to the rest that carries the tool; for if the point were moved, say four times, at stated intervals, from the centre of the mandrel out to the original curve and returned back to the centre, that an ellipsoid would be traced, having its greatest curvature at the circle, and least when approaching the centre; there would be four of these, and their dimensions in all, except the longest diameter, will be exactly in proportion to the relative speeds of the rotation and the lateral motion of the rest.

The combinations are endless, and the positive motion is secured by gearing of different numbers, so that a great variety of geometrical figures can be obtained; not so many as in the kaleidoscope, the figures of which must consist of angular forms. The work to be done is put up in the chuck, and therefore the lathe would assume enormous proportions were each plate to be engraved to be chucked; and, again, no two figures would be exactly alike. Resort is had, therefore, to the principle of transfer; a small plate is chucked and the lines cut in for a design, and, after the engraving is done, the plate is hardened. It will be observed that these lines are cut in, and, if we transfer, we shall have them in relief, but reversed.

A steel is now prepared of a circumference so large that the design will measure but a small part of it, its thickness, of course, a little more of the width of the engraving to be transferred; this roller is made of the finest steel and turned up true, the surface is decarbonised, and in this condition it is set upon its edge on the hardened engraved plate, which has been placed on the bed of the transfer-press,—a machine capable of giving an enormous pressure, and fitted with adjustments on its bed for correct positions; the point of contact with the roller which it presses on has the facility to move while the pressure is on. Now, the roller being placed on the die, the pressure is applied; at the same time the roller is made to rotate over the die. In this manner a *relievo* impression of the die is obtained, and then the roller in its turn is hardened and is ready for use, to transfer a *facsimile* of the original on to any steel plate. The pressure required for the second transfer is not nearly so great as it was for the first. We have given no drawings, for our readers may examine any national bank-note, and he will find a much better illustration than we would dare attempt.

The combinations of lines can be multiplied to any extent, and the devices will vary with the gearing that gives the positive movement to the mandrel and rest; one tooth, more or less, would give an entirely different device. The geometric lathe can give them any outline, from a triangle up to the full circle. Now, in watch-cases, a somewhat analogous lathe is used, the principle of motion (positive) is employed, though the rest is not movable, except by the screw that is used for feed.

If the reader will attentively examine a gold dial, he will find that the whole effect is produced by lines cut in the surface. He will see that, to produce the effect of rays, the lines are divergent or radial from the centre. This, however, is done by the ruling, or, as it is technically termed, the straight-line machine.

The backs and fronts of the cases are generally barley-corned—at least on some portion of their surface. On looking attentively at a finely barley-corned case, the first thought is that it is done by curved radial lines. Such is not the case, however; the lines are circular, but waved, the wave of each succeeding line halving on the wave of the preceding. This is done by means of a rose-engine; and as it may be of interest to a great number of our readers to learn something about it, we will endeavour to give a description of the machine by which such beautiful work is done. Suppose the mandrel of the lathe to be placed in a frame, being analogous to the swing rest. The headstock of the rose-engine is hung on centres, and the mandrel is capable of an endlong motion. This arrangement enables the centre to be moved as in the case of the geometric lathe, the only difference being that, while the centre of the first describes a straight line in its motion, the centre of the rose-engine must describe a circle. On the mandrel of the lathe are placed loose, but attached to each other, a series of brass or rather composition disks, cut on the edges with varying degrees of fineness, with the different amount of wave sought to be produced in the line the tool cuts in the surface of the gold or silver. These disks are also fluted on the face to produce an endlong motion of the mandrel.

Firmly attached by the key to the arbor, there is a large plate that carries a tangent-screw which works in a worm gear that is screwed to the composition forms; so that it is plain, if the pitch of the screw is just one-half the pitch of a wave; one turn will set the pattern one-half the way at a turn. We have given this only as the theoretical idea; in practice there are from five to six different composition patterns on the arbor, with as many different-sized waves; and it follows that some calculation is necessary to get the proper amount of turn to the screw. On the lathe-bed there is a base firmly attached that takes in, like the ordinary slide-rest does, a pair of dogs, polished on the end, and rounded enough to take off any sharp edge, and which are pressed firmly against the corrugated patterns. The mandrel is pressed forward by a strong spring, and the same may be said of the endlong motion. Now if the mandrel is revolved with the pattern in contact with the dog, the mandrel will have a vibratory motion, the spring always keeping the contact complete. The tool is a stationary point, compared to the mandrel, for it is moved only with the feed screw in order to give the difference in the distance of the lines.

The rest is capable of three motions—a circular, a straight feed, and an end motion to bung the tool up to the work; and this effect is produced entirely by the hand, as the whole is regulated by a stop just one side of the cutting tool, which regulates the depth of the cut. As the point of the tool is ground up and finished with two angles, it is plain that at the curved portion of the work the cut would not be correct if the tool was kept parellel to the axis of the mandrel; for one side of the cut would be broader than the other, and thus spoil the effect. Now, in the operations the workman is careful to keep the tool, by means of the circular rest, always at right angles to the part of the surface he is turning; but as a watch-case is not a true sphere, much judgment has to be used in attaining this point; again, if the lines are not equally divided in proportion to the curvature, a cloudy appearance will be the result.

(*To be continued.*)

Electro-Plating with Nickel.

By William H. Wahl.

[A paper read before the Chemical Section of the Franklin Institute, and published in the Journal of the Institute]

(Continued from page 186.)

No. 5.

Sulphate of nickel	6 parts.
Citrate of nickel	3 ,,
Phosphate of nickel	3 ,,
Benzoic acid	1½ ,,
Water	200 ,,

No. 6.

Phosphate of nickel	10 parts.
Citrate of nickel	6 ,,
Pyrophosphate of sodium	10½ ,,
Bisulphite of sodium	1½ ,,
Citric acid	3 ,,
Aqua ammonia	15 ,,
Water	400 ,,

(Powell's solutions.) These solutions yield good results, but their complex composition must debar them from general use.

Ne. 7.

Sulphate of nickel	6 parts.
Aqua ammonia	3 ,,
Water	1 0 ,,

When the nickel is dissolved, add—

Aqua ammonia	20 parts.

This bath is similar to that recommended by Prof. Boettger; it is said to be well suited for the purpose of amateurs, inasmuch as it gives good results with a platinum anode. It is worked at a temperature of 100° Fah., with a moderate current. It requires renewal, from time to time, as it becomes impoverished in nickel, by addition of fresh nickel salt; it must also be kept alkaline by the occasional sddition of ammonia.

No. 8.

Sulphate of nickel and ammonium	10 parts.
Sulphate of ammonium	1½ ,,
Water	250 ,,

Dissolve in boiling water and allow to cool. These proportions are recommended for coating objects of cast and wrought iron and steel.

No. 9.

Sulphate of nickel and ammonium	10 parts.
Sulphate of ammonium	2 ,,
Water	300 ,,

Dissolve as above. Recommended for coating brass, copper, tin, Britannia, lead, zinc, etc.

No. 10.

Sulphate of nickel and ammonium	6 parts.
Chloride of ammonium (sal-ammoniac)	3 ,,
Water	100 ,,

Watt* recommends for ordinary purposes the following solution, which he affirms will give in careful hands very good results. "Take say 2 ounces of pure nickel, dissolve in hydrochloric acid, taking care not to have an excess. A gentle heat will assist the operation. When dissolved, dilute the solution with 1 quart of cold water. Now add ammonia gradually, until the solution is quite neutral to test-paper. Next, dissolve 1 ounce of sal-ammoniac (chloride of ammonium) in water, and mix this with the former solution. Lastly, evaporate and crystallize slowly." The resulting salt will be the double chloride of nickel and ammonium. It is one of the earliest solutions used for nickel-plating by Smee and Gore, and is affirmed by these writers to give good results. Watt has also obtained excellent results with the double chloride. According to Smee, the simple chloride of nickel will yield a deposit having a very brilliant lustre.

I can unqualifiedly confirm the statement of Gore* that the electro-deposit obtained from a solution of the double cyanide of nickel and potassium is "nearly equal in whiteness to silver." I have obtained deposits with this solution of such extreme whiteness and beauty as to deceive even an expert on casual inspection into the belief that they were silver. The bath, however, rapidly loses its activity and runs down, and is so difficult to manage that it is impracticable for general use. This, at least, is the opinion I have reached after many trials of it. I am informed, nevertheless, that it it is successfully used on the large scale in certain nickel-plating works in this country, though I have not been able to substantiate the fact.

To prepare this bath make a solution of any salt of nickel, and add cyanide of potassium solution so long as a precipitate continues to be formed, being careful to avoid adding an excess. Then remove the liquid either by decantation or filtration; and after several washings dissolve the precipitate almost to saturation in cyanide of potassium solution. Make a completely saturated solution and add a small quantity of free cyanide of potassium. The brownish-red solution is then ready for use.

It may be added, in conclusion, that the double sulphate of nickel and ammonium is used most generally by electroplaters with nickel.

General Observations.

Where the double sulphate of nickel and ammonium is used, it is important that the operator should bear in mind the caution to maintain bath as nearly neutral as possible. There is a diversity of opinion among the nickel-platers upon this point, some preferring to operate with a slightly acid bath, while others prefer the opposite condition. Experience has shown that the solution will give satisfactory results either when slightly acid or slightly alkaline, and, as the chemical character of the bath during electrolysis is constantly being modified, it is manifestly impossible for the operator to do more than to keep his solution approximately in the right condition. A strongly acid solution will fail to give a deposit. When the bath, therefore, is found to be in this condition the addition of sufficient ammonia to restore its neutrality will bring it to working condition.

It is only by accident or carelessness, however, that the solution will become inoperative from this cause, as the chemical changes which occur in the solution of this salt, under the influence of the electrical current, and under the conditions in which it is commonly used in the plating bath, arc such as to cause it to gradually assume an alkaline character. This is due to the fact that not simply sulphate of nickel but to some extent also sulphate of ammonium undergoes decomposition into its proximate constituents. The sulphuric acid set free by the decomposition of the ammonium sulphate will form an equivalent quantity of sulphate of nickel by solution of the anode, while the ammonia will remain free, and gradually, as it accumulates, will impart a decided alkalinity to the bath. The more intense the current employed, the more rapid will be the decomposition of the solution and the liberation of free ammonia. As this change progresses, the quality of the work is more or less unfavourably influenced. Accompanying this change, especially where the current employed is irregular and at times too intense, there is also a precipitation of some of the nickel, probably in the form of basic salt, by which the metallic strength of the bath is impaired, and which necessitates the addition of fresh quantities of the double sulphate from time to time.

(To be continued.)

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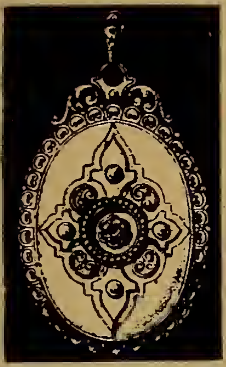
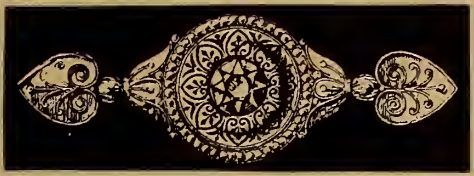
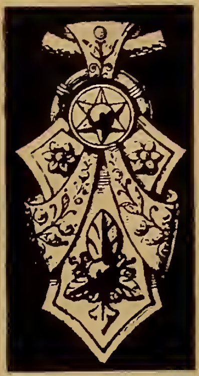
* Watt, "Electro-Metallurgy" (7th ed.), p. 94.

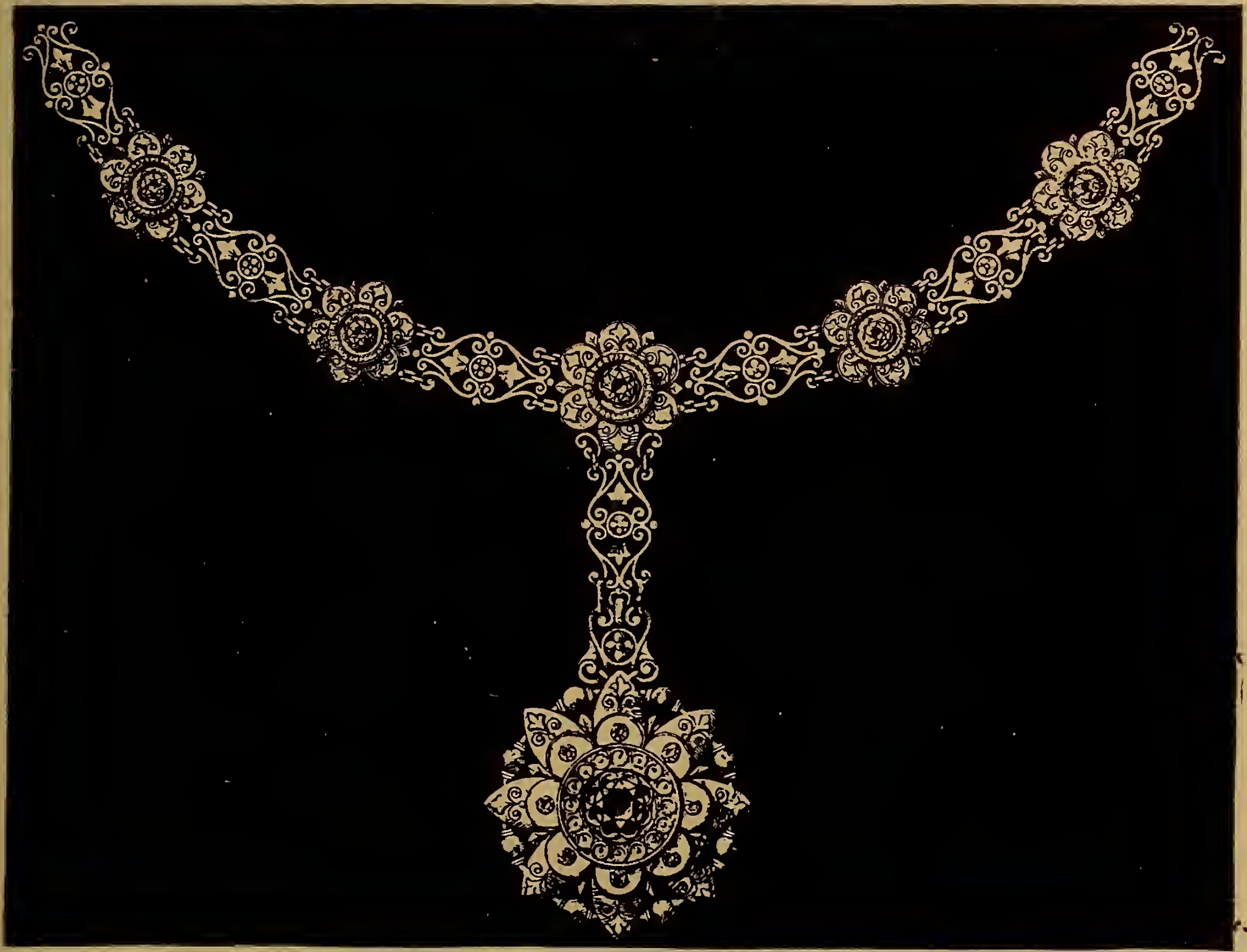
* Gore, "Electro-Metallurgy" (1877), p. 233.

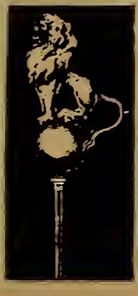
MONTHLY SUPPLEMENT OF DESIGNS.

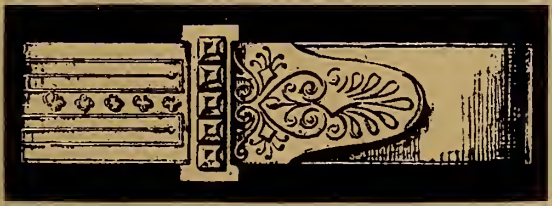


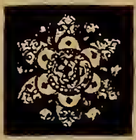












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ILLUSTRATED SUPPLEMENT:—"Designs for Modern Jewellery."

The Patents, Designs, and Trade Marks Act of 1883.

By C. Stuart Murray.

(*Continued from page* 7.)

WE now come to one of the most valuable provisions of the Patent Laws that has ever been known in this country; it is this:—The exhibition of an invention at an industrial or international exhibition, certified as such by the Board of Trade, or the publication of any description of the invention during the period of the holding of the exhibition, or the use of the invention for the purpose of the exhibition in the place where the exhibition is held, or the use of the invention, during the period of the holding of the exhibition, by any person elsewhere, without the privity or consent of the inventor, shall not prejudice the right of the inventor or his legal personal representative to apply for and obtain provisional protection and a patent in respect of the invention or the validity of any patent granted on the application, provided that both the following conditions are complied with, namely:—(*a*) The exhibitor must, before exhibiting the invention, give the comptroller the prescribed notice of his intention to do so; and (*b*) The application for a patent must be made before or within six months from the date of the opening of the exhibition.

In exhibitions of various kinds inventors always took care not to send anything that was not fully protected either by provisional specification or by patent. However, in what is known as the Great International Exhibition of 1851 we believe that the protection was given by an Order in Council; so was it in the one of 1862, and others since then. Last year we had the "Fisheries," whilst this year we have the "Healtheries;" and, with respect to the inventor, Orders in Council are no longer required, the new Act effectively taking care of him and his in that respect "for evermore."

The next important feature of the law is the publication of an illustrated Patent Journal, which will be a very different affair, or rather which is a very different affair, to what we have hitherto been served with. The Comptroller shall cause to be issued periodically an illustrated journal of patented inventions, as well as reports of patent cases decided by courts of law, and any other information that the Comptroller may deem generally useful or important. Provision is to be made by him for keeping on sale copies of such Journal, and also of all complete specifications of patents for the time being in force, with their accompanying drawings, if any. He shall also continue, in such form as he may deem expedient, the indexes and abridgments of specifications hitherto published, and shall from time to time prepare and publish such other indexes and abridgments of specifications, catalogues, and other works relating to inventions as he may see fit. We cannot do less than congratulate the framers of the Act for having placed the nucleus of such an essential library at the disposal of the intending patentee.

The late Mr. Bennett Woodcroft, the able superintendent of the Patent Office, gave us, in 1858, the first instalment volume of the "Abridgments and Specifications relating to Watches, Clocks, and other Timekeepers," which have been found to be very useful to people other than watchmakers. The patents relating to gold and silver manufacture we have not as yet been able to see; but they shall not be forgotten. The Abridgments about Timekeepers are certainly not the least interesting of the contents of the patent volume, which has been aptly described as "the biggest book in the world" What to us is both singular and interesting is, that the first timekeeping patent in that book runs thus :—

A.D. 1661, February 8.—No. 131.

"Worcester, Edward, Marquess of.—1. To make a watch or clocke without string or chaine, or any other kind of winding vpp, but what of necessity must follow, if the owner or keeper of the said watch or clocke will know the houre of day or night, and yett if hee lay it aside severall dayes and weeks without looking or meddling with it, it shall goe very well, and as justly as most watches that ever were made." The above is an extract from the "Signet Bill," dated the 15th of November, A.D. 1661. There was no specification enrolled ; but something more may be seen in an early volume of the "Register of Arts and Sciences" and in Stuart's "Anecdotes of Steam Engines." Now, the year 1661 was that following the restoration of Charles the Second, the grand event having occurred upon the 29th of May ; so that the inventive marquis was only nine months behind with his wonderful watch. Patents were patents in those days, and, like a good Chancery suit to a lawyer rearing a fast-ripening family crop of boys and girls were not to be lightly thrown on one side. There have been inventors since the Marquis of Worcester's time, and inventors must occasionally have model-makers—and good ones, too, if they can be had—who will sometimes make their "pile" before their employer, the inventor.

The second volume of "Abridgements" brought them down to the end of December, 1866, and we have not heard of a later one, although such was intended. What the new journal may be, can be understood from the statement about it in the new Act.

The *Patents Journal* has been in existence for many years, and contains much floating information upon patent work. The office in Southampton Buildings, Chancery Lane, is a world-famed place. It contains the "biggest book in the world," just mentioned, about which book much interesting matter could be written. We do not know to what size it has grown now, but some idea of it may be formed from the following description :—

"Specifications of Patents for Inventions, Disclaimers, etc., enrolled under the Old Law, from A.D. 1617, to October 1852, comprised in 13,561 Blue Books, or 691 thick volumes imperial 8vo. Total cost price about £600"! We wonder how much space watches and clocks, and all things that appertain thereto, occupy in those 13,561 Blue Books. That was in 1852, and this is our present year of grace 1884 ; so that there are thirty-four years' publication to add to what has gone before. Mercy upon us !—what a world of speculative thought opens upon us here !

Inventas aut qui vitam excoluere per artes,
Quique sui memores alios fecere merendo.

("Men who have improved life by their inventions, and have insured remembrance by their deserving well.")

The control and management of the existing Patent Museum and its contents shall, from and after the commencement of this Act, be transferred to, and vested in, the Department of Science and Art, subject to such directions as Her Majesty in Council may see fit to give. The same authority may at any time require a patentee to furnish a model of his invention, upon payment to him of the cost of the manufacture of the said model; the amount to be settled, in case of dispute, by the Board of Trade.

The next point is with respect to the application of foreign vessels in British waters. In the old Act of 1852, Section 26 deals with the use of inventions in foreign ships resorting to British ports, with this exception, namely, that where British ships are prevented the use of foreign inventions when in foreign waters, then the ships of such foreign States were not to be allowed the use of British inventions in British waters. The new Act directs that a patent shall not prevent the use of an invention for the purpose of the navigation of a foreign vessel within the jurisdiction of any of Her Majesty's Courts in the United Kingdom or Isle of Man, or the use of an invention in a foreign vessel within that jurisdiction, provided it is not used therein for or in connection with the manufacture or preparation of anything intended to be sold in, or exported from, the United Kingdom or Isle of Man. But this section of the new Act is not to extend to vessels of any foreign State, of which the laws authorise subjects of such foreign States, having patents or like privileges for the exclusive use or exercise of inventions within its territories, to prevent or interfere with the use of such inventions in British vessels while in the ports of such foreign State, or in the waters within the jurisdiction of its courts, where such inventions are not so used for the manufacture or preparation of anything intended to be sold in, or exported from, the territories of such foreign State. It will be seen that this is a re-enactment in a fuller manner of the old section which has been mentioned above.

We now come to a part of the Act which relates to the Government for the time being. We mentioned in a previous paper that a patent now bound the Crown, and that free use was no longer allowable. That is more fully set forth in another section, as follows :—

"The inventor of any improvement in instruments, or munitions of war, his executors, administrators, or assigns (who are in this section comprised in the expression, 'the inventor') may (either for or without valuable consideration) assign to Her Majesty's Principal Secretary of State for the War Department, (hereinafter referred to as the Secretary of State) on behalf of Her Majesty, all the benefit of the invention and of any patent obtained, or to be obtained for the same, and the Secretary of State may be a party to the assignment. The assignment shall effectually vest the benefit of the invention and patent in the Secretary of State for the time being on behalf of Her Majesty, and all covenants and agreements therein contained for keeping the invention secret and otherwise shall be valid and effectual (notwithstanding any want of valuable consideration), and may be enforced accordingly by the said Secretary of State. Where any such assignment has been made to him, he may at any time before the application for a patent for the invention, or before publication of the specification, certify to the Comptroller his opinion, that, in the interest of the public service, the particulars of the invention and the manner in which it is to be performed should be kept secret. If the Secretary of State so certifies, the application and specification with the drawings (if any), and any amendment of the specification or specifications, and any copies of such documents and drawings, shall, instead of being left in the ordinary manner at the Patent Office, be delivered to the Comptroller in a packet, sealed by the Secretary of State, or by his authority. Such packet shall, until the expiration of the term, or extended term, during which a patent for the invention may be in force, be kept sealed by the Comptroller, and shall not be opened save under the authority of the Secretary of State, or of the law officers. Such sealed packet shall be delivered, at any time during the continuance of the patent, to any person authorised by the Secretary of State to receive the same, and shall if returned to the Comptroller be again sealed by him. On the expiration of the term, or extended term of the patent, such sealed packet shall be delivered to any person authorised by writing under the hand of the Secretary of State to receive it.

"Where the Secretary of State certifies in the way just explained, after an application for a patent has been left at the Patent Office, but before the publication of the specification, the application with the above-named, and the drawings (if any), shall be forthwith placed in a packet sealed by authority of the comptroller, and such packet shall be subject to the foregoing provisions respecting a packet sealed by authority of the Secretary of State. No proceeding by petition or otherwise shall lie for revocation of a patent granted for an invention in relation to which the Secretary of State has certified in the way laid down. No copy of any specification, or other document or drawing which is required to be placed in a sealed packet, shall in any manner whatever be published, or open to the inspection of the public; but, save as in this section otherwise directed, the provisions of this part of this Act shall apply in respect of any such invention and patent as aforesaid. The Secretary of State may, at any time, by writing under his hand, waive the benefit of this section with respect to any particular invention, and the specifications, documents, and drawings shall be henceforth kept and dealt with in the ordinary way. The communication of any invention for any improvement in instruments or munitions of war to the Secretary of State, or to any person or persons authorised by him to investigate the same, or the merits thereof, shall not, nor shall anything done for the purposes of the investigation, be deemed use or publication of such invention so as to prejudice the grant or validity of any patent for the same."

There was an Act passed in April, 1859, known as the 22nd Victoria, cap. 13, which dealt with this very subject. It was called, "an Act to amend the Law concerning Patents for Inventions with respect to Inventors for Improvements in Instruments and Munitions of war." The new Act is merely a repetition of the old one, and, in some instances, in the same words.

Existing patents have several provisions belonging to them under the new law which it is necessary to know. In the first place the present Act does not meddle with applications and proceedings upon them, which took place before it came into operation. Every patent that has been granted under the old law, or on any application pending under it, remains unaffected by the provisions of the new Act, relating to those binding the Crown, and to compulsory licenses, in all other respects (including the amount and time of payment of fees) this Act shall extend to all patents granted before the commencement of the Act, or on applications then pending, in substitution for such enactments as would have applied thereto, if this Act had not been passed. All instruments relating to patents granted before the commencement of this Act required to be left or filed in the Great Seal Patent Office, shall be deemed to be so left or filed, if left or filed before the commencement of this Act in the Patent Office.

The "definitions" are that "patent" means letters patent for an invention; "patentee" means the person for the time being entitled to the benefit of a patent; "invention" means any manner of new manufacture the subject of letters patent and grant of privilege within Section 6 of the Statute of Monopolies, which is a curious piece of legislation. Its introduction as a Bill into the House of Commons would be utterly scouted in these days. It was known to the lawyers of the day as "An Act concerning Monopolies and Dispensations with Penal Laws and the Forfeiture thereof." It was passed in the twenty-first year of the reign of James the First. We might quote some of it here, but even a quotation would be too lengthy for our purpose, so we must pass it by. We must not omit to say that "injunction" in England means "interdict" in the law of Scotland.

(*To be continued.*)

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Engraving.

(*From the "American Horological Journal."*)

(*Continued from page* 15.)

IN our last article, which treated of the process of etching, and gave an explanation of the geometric lathe, by which dies are engraved with combinations of lines forming geometric figures. We propose to continue the subject of engraving, and will speak of the work which is done by the hand. Almost all engravings are produced by etching, combined with lines made by the hand. The lines made with the graver, without the use of acid, are technically called "dry pointed."

For engraving on steel and copper, a few tools only are necessary.

First, are the etching points, of which only one or two are necessary.

Second, gravers, two or three of which are required, which may be lozenge-shape or square. A scraper and a burnisher are also required.

The etching points are used to trace lines through the varnish on the plate, for the action of the acid. They are also used to make light lines on the plate when acid is not to be employed. The gravers are used to cut deep and broad lines. The scraper is used to remove any burr of metal raised by the graver in cutting; also in the kind of engraving called mezzotint, the different shades of tint are scraped out by this tool. The burnisher is used to make the bright lights in mezzotint engraving, and to remove accidental scratches on plates; and in line engravings to erase lines that have been cut too deep.

In mezzotint engravings the plates are prepared by rolling over them in every direction a small wheel with sharp points, which covers the plate entirely with minute dots; and, if printed from, would present a black surface. When thus prepared, the design is traced upon the surface, and the engraver takes the scraper and scrapes to greater or less depth, according to the tint required. In the highest lights the burnisher is used, as aforesaid. The effects produced by the mezzotint process are very soft. There are no lines, and the different tints shade into each other with delicate gradations; and this process is also employed in connection with line engravings, with happy results.

"Stippling" is a term employed to denote effects produced by series of dots. When used alone, the gradations of shade are made almost imperceptibly. In all work indicating softness and delicacy, stippling may be employed to advantage. In most representations of statuary stippling is used alone, the absence of lines giving an impression of the surface of the marble. With line engraving stippling is also much used. In most pictures in which human figures are represented, the flesh tints are produced by stippling, sometimes alone, and sometimes combined with delicate lines. Line engraving consists of series of lines side by side, of greater or less depth, according to the colour required. When series of lines cross other series of lines, the term cross-hatching is used. It may be observed here that the lines are cut into the metal; and, to print, the ink is filled into the lines, the surface of the plate being made entirely clean. The plates are then passed under heavy rollers, and an impression is made on paper upon the press. In former times copper was the principal material used for plates; but, as a limited number of impressions could only be made, steel was substituted for copper. It is harder to cut than copper, but is so much more durable that it is generally employed, especially for bank notes. And recently an invention has been made by which copper plates, after being engraved, may be faced with steel, thus increasing their durability.

The introduction and use of steel plates may be claimed as American. About a quarter of a century ago, Jacob Perkins invented a method of hardening steel after it was engraved. By bank-note establishments this method is extensively employed to obtain duplicates of designs. A design is engraved with the finest skill and beauty, rollers of softened steel are prepared and passed over this finely engraved plate, receiving a sharp impression in relief. These rollers are then hardened, and are dies, from which may be made as many impressions as are required. A large steel plate is softened, and a number of impressions are made from the die on it. It is then hardened and ready for printing.

To digress a little, we will state that the bank notes of the United States are the finest in use in the world. The present Bank of England notes are printed from an electrotype surface and an indifferent quality of paper.* The notes of the Bank of France are also printed from an electrotype surface, though in a much neater and more elegant manner than the Bank of England.

Bank notes require vignette or picture engraving, letter engraving, and geometric engraving by machines. The pictures or vignettes are usually executed in lines; stippling and mezzotint not being sufficiently durable. It is customary for engravers to confine themselves to special departments of art. An engraver of pictures rarely cuts letters; and a letter engraver seldom can engrave pictures. There is also much work that comes within the province of the letter engraver; scroll work and other ornamental designs are within the scope of this department. Heretofore we have been speaking of engravings from which impressions are made. But the letter engraver finds a large field for the exercise of his talents in engraving upon plate and jewellery. All lettering is done on silver and gold in the same manner as on copper or steel. In another paper, we will take up this department of the art, including ornamentation and enchasing.

(*To be continued.*)

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The Seven Metals of the Ancients.

The ancients had a knowledge of seven metals, viz., gold, silver, copper, tin, iron, lead, and mercury (or quicksilver). They were each sacred to some ruling deity. Homer has mentioned all these except mercury. Mercury was common in the century next before the Christian era. Gold, indestructible, malleable, the richest in colour, in its lustre, and its property of not being altered or even affected by the air, has been known from the remotest times. It is the Sol or sun of the alchemists, who represented it by the circle—the emblem of perfection. There are drawings of gold washings on Egyptian tombs as early as 2,500 years before the Christian era, and fine gold wire was made into ornaments—often found on mummies—by the Egyptians 3,500 years ago. It was coined into the heavy *daries* of Persia, and woven into delicate threads that enlivened the flowered stuffs of Babylon.

In the earliestd ays of Greece gold existed in great abundance in the Levant. Crœsus, B.C. 560, coined the golden *stater*, and about B.C. 207 gold coins were first struck off at Rome, and were denominated *aurl.* Copper came into use next after silver and before iron. It was called Venus by the ancients, who gave it the symbol of that planet. The age of copper followed the stone age. Homer wrote in the copper age. His famous shield of Achilles is made of gold, silver, and copper, a small quantity of tin being put in to harden it. The shield is itself a proof of the art of design, and the working in metals having attained a very high degree of perfection among the Greeks at a period believed to have been B.C. 962. In a mine near Lake Superior there was found, in 1858, a mass of copper forty-eight feet long, twenty feet high, and calculated to contain 150 tons. Brass, which has often been confounded by ancients with copper, is merely an alloy made by mixing one-third of zinc with two-thirds of copper. Brass was made by the ancients without discovering zinc. Iron, the most important of metals, came into common use long after copper was well known. It was regarded by the ancients as a symbol of war, and received the name of Mars, the god of arms. Homer mentions a mass of iron as one of the prizes at the funeral games given by Achilles in honour of Patrocius:—

> Then buried the hero, thundering on the ground
> A mass of iron, an enormous round,
> Whose weight and size the circling Greeks admire,
> Rude from the furnace, and but shaped by fire.

In 1537 B.C. the Lacedemonians coined iron into money. At Babylon the huge stones of the bridges were held together by bands of iron fixed in places by molten lead. Thucydides tells us that the walls of Pireus were fastened in the same way. In preparing the stone for building the pyramids iron was used, Herodotus affirms; and iron must have been employed in engraving the beautiful old gems which now are so valuable. The Ninevites made tools of iron, the ancient Britons made spears and lances of it, and the Romans, during their occupation of Britain, smelted iron to a considerable extent. The iron mines of Elba are said to have been worked from the time of Alexander the Great; and Pliny speaks of this region as "inexhaustible in its iron." The mines of Arragon and New Castile in Spain are supposed to have been worked from the times of the late Jewish kings, successively by the Tyrians, the Carthaginians, and the Romans. Through all the nations of high antiquity, iron is mentioned almost always in a way that shows it to have been a partially common but always highly highly esteemed metal. Indeed, from the difficulty of working it with the primitive means at the command of men just emerged from barbarism, it was held at a high price. Only 153 years ago, Batachoff, in Russia, bartered iron for an equal weight of copper coin. Lead, a bluish-grey metal, was known to the Egyptians at an early date, and is mentioned by Homer; it was used in Rome in pipes to convey water, and in thin sheets for roofing purposes. The powder (cyrussa) used by the Athenian ladies to tint their complexion was our white lead. Lead owes its usefulness in the metallic state chiefly to its softness and fusibility. In ancient times tin was scarce, and the chief supply was from India, Spain, and the celebrated mines of Cornwall, England, which have been worked uninterruptedly from the earliest historic periods. Tin was used by the Egyptians nearly 4,000 years ago.

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* [Written in 1870, Ed.]

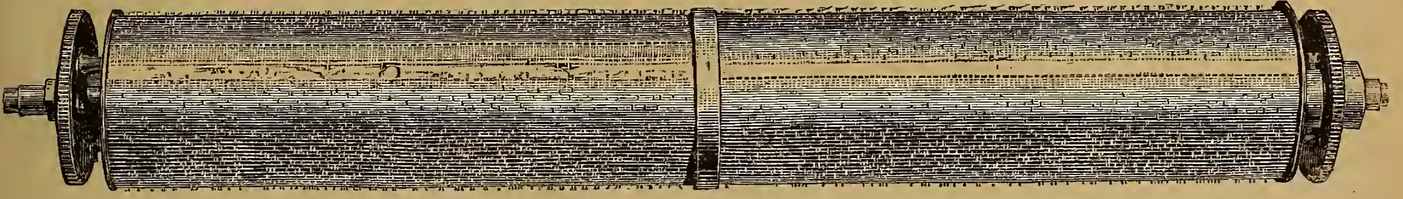
Musical Boxes.

A Glance at their Manufacture at St. Croix, Switzerland.

(*Continued from page* 10.)

> "The gloomy views of Calvin, the reformer of Switzerland, led him to pursue a course very different from that of Luther, and to mark his hostility to the pretensions of Rome by an entire rejection of all the usages of her Church. Not a musical instrument was suffered within the walls of Geneva for more than a century after the Reformation; and music, except in his own metrical psalmody, was proscribed wherever the doctrines of Calvin were received."

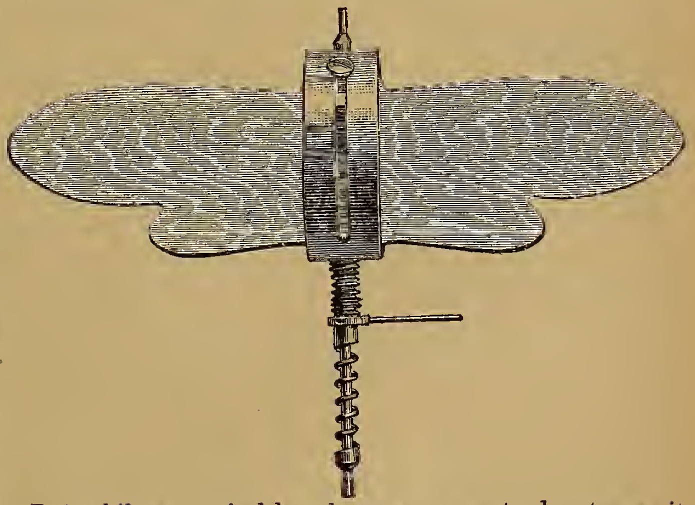
THE mechanical combination employed by Messrs. Paillard & Co. for playing long pieces of music without intermission consists of a duplex cylinder operating upon two separate combs. The engraving, with a little explanation, will give a fair idea as to how it operates. In the spaces between the wheels at each end of the cylinder will be found the ordinary arrangement by which the barrel is shifted for playing a fresh tune: but they do not operate simultaneously; the one at the extreme left operates first, and while this barrel has ceased to play, and is being shifted for a fresh part of the air, the strain is continued by the barrel on the right hand; immediately the left-hand barrel resumes playing, the right-hand barrel is then shifted, and they accompany each other. Anything more simple or more mechanically perfect it would be difficult to conceive. The proprieter was kind enough to give me the history of this invention. It appears the first idea occurred to Mr. Amedée Paillard, in the year 1873, while employed in constructing a magnificent musical-box for the Philadelphia Exhibition, valued at £1,200. But the mechanism he suggested was perfected and simplified by a St. Croix workman—a Mr. Jeanrenaud, recently deceased, who sold his invention to the firm of Messrs. Paillard and Co., whose London house is 62, Holborn Viaduct; New York depôt, 680, Broadway, where these boxes may be seen by all interested. I can promise visitors a musical treat.



The Fly.—When Sir Edmund Becket was designing the celebrated Westminster clock, he experienced what all makers of quarter clocks have experienced—a difficulty in getting machinery to chime the four quarters in equal periods of time. He found that the heavy bar in the first quarter greatly retarded the progress of the fly, and consequently it was played at very slow time; but the fly having to some extent got up speed, the second quarter was played in much less time; the third was quicker still; and the fourth so quick that it completely destroyed the effect. After trying several expedients, he at last adopted what Vullamy had long ago suggested, viz., to increase the size of the fly and its number of revolutions, and also increase the motive power until the desired result—perfect time—had been obtained. Sir Edmund has more than once acknowledged his indebtedness to Vullamy, so that the charge of plagiarism cannot be preferred. The mechanical principles which underlie the foregoing remarks on the fly is precisely what this firm have adopted in all their large musical-boxes—abundance of power, with a very large fly measuring 5½ inches by 2½ inches. Instead of the old expanding fly they have introduced a new and very ingenious device, which consists of two wings joined together, and may be shifted from a vertical to a horizontal position for the purpose of regulating the time.

The enormous power required in their large boxes, is obtained from four large barrels operating in one pinion; the diameter of each barrel is 5½ inches, and the width 3¼ inches. The advantage of this combination is this: the main springs are all broad and thin, and on this account are not likely to break. I estimate their combined force at four hundred pounds, and though the power is so great yet by the combination of levers attached to the barrels they may all be wound at once by a child.

The fly, as shown in the engraving below, is in a vertical position for playing at slow time; but by moving the screw near the top pivot down the slot the wings take a horizontal position, which, in rotating, experiences little atmospheric resistance, and consequently increases the speed. The advantages of this arrangement over the old style are these:—It is perfectly noiseless. The whissing sound in the old fly often arises from the unequal positions of the wings, and forms a most unpleasant accompaniment, especially when the music is soft and smooth, and is more easily shifted, which is a great convenience to those who are not familiar with mechanical operations. It is made in a very fine press tool, out of one piece of sheet brass; so that its parts are few, and cannot easily be broken. In its performance I could not detect the slightest hesitation even in the heaviest bar of music. By using this fly a musical-box may be made absolutely perfect in time; so perfect, that the most accomplished performers, vocal or instrumental, cannot hope to rival it.



But while a musical-box has many great advantages, it has its weak points also. Hitherto it lacks expression. I shall be allowed to explain that this word expression is employed to represent, not the mere act or power of uttering articulate sounds, but rather the *manner* of doing it, so as to produce a striking effect, and forcibly appeal to the feelings. As in reading and declamation an accent or emphasis is laid upon particular words and syllables, so a similiar force of expression is given to certain notes in music. *Expression* constitutes one of the first requisites of a musical performer; and though attention to the rules of art may assist, yet, to give it due effect, much must depend upon feeling, taste, and judgment. A master in music will sometimes give such terrible emphasis as to make us tremble at the performance of the "Dead March in Saul;" and it is also the same source which enraptures us with grateful assurance, when we listen to the grand production of Haydn in his most beautiful anthem, "As pants the hart for cooling streams," and it is surprising to find how near to perfection are some of the instruments produced by this firm. The same high commendation may be given for transposition of music; it is as correct as possible.

Time and space would fail me were I to attempt even to enumerate the volumes of music to be found in their library; it must suffice to state it contains the principal productions, sacred and secular, of the greatest masters of ancient and modern times. Here you will not only find the collection of Pope Gregory I., which it is well known contains the very tunes which Jesus sang, but you will also find the most recent air that is sung at the missionary meetings of Moody and Sankey. I was surprised to learn that no less than 6,000 pieces are in stock to select from.

Switzerland has no patent laws, yet I have shown she produces many valuable inventions. Her Church has no music; yet the Swiss are a merry, musical people. Shall I commend the Church and State for their neglect? No; I will condemn both. What would be the inventive power of her people, if their inventions were better protected and remunerated; and to what heights of rapture would her music reach, if, in their religious services, her people were enlivened with the seraphic songs of the son of Amos!

P. S. I enclose photos of St. Croix, the factory and some magnificent goods manufactured there. You are at liberty to make any use of them you may think fit.

Erratum.—Page 10 fourth paragraph, instead of 16 lines or 3½ inches read 36 lines or 3¼ inches.

(*To be continued.*)

The Silversmith and his Strange Visitor.

HISTORY is full of the caprices of Fortune, and of her elder sister "Miss" Fortune, although we once heard of a venturesome youth who boldly took, "for better or worse," a damsel of winning manners, bearing the appellation of the second-named "lady." He grew to be a prosperous gentleman. Upon one of the lady's birthdays he invited a number of intimate friends and their spouses to "join with him in spending an evening in the company of Misfortune." Some of them, as they said, "could not see it"; others, that there was "some grim joke in the wind"; whilst a very few, the lady's own family chiefly, saw it "as plain as a pike-staff," which is about the plainest-seen article that an Englishman knows of. The evening arrived: the guests were all present, a goodly show, and an excellent German band discoursed suitable music on the lawn in front of the house, the capacity of the latter being considerably extended by tents and awnings; indeed, it was in a large marquee that the dinner was laid. What particularly puzzled the know-nothings of the company was this expression upon the card of invitation:—"Ten years of misfortune." There was a portrait on the card, as well, of the mythical Fortuna, the goddess of many temples in many cities, blindfolded, and leaning on her wheel in the proper orthodox manner. There is one feature about her votaries that is not very widely known.

The first of April in those times was consecrated to Venus among the Romans; and upon that day the Italian widows and marriageable virgins assembled in a Temple of Fortune, and, after burning incense and offering their garments, they prayed the goddess to hide from the eyes of those husbands of theirs—*that were to be*—any bodily defects that might, after marriage, be discoverable upon their spouses. What an eye to the future those ladies had, to be sure!

Well, the invitation cards were ornamented as stated; and under Fortuna's feet were artistically engraved the words, *Sed profecto Fortuna in omni re dominatur*—"but assuredly Fortuna rules all things." The dinner was all that could be desired, and was accompanied by much tittering and whispering and squinting at the cards. When that important function, the removal of the cloth, was effected, the "worthy host" got up to the call of the toastmaster, and at that instant the gas was turned down, to the puzzle of everybody, wives, widows, maidens, and all. I ought to have mentioned before, but quite forgot it, that a considerable buzz of surprise had been floating in the air, during the evening, at the fact that the lady of the house had not been seen by any one, whilst servants' answers to inquiries consisted in ominous shakes of the head and some kind of half-wobegone looks, but no information. What *could* be the matter? Speculation ran wild in an uncomfortable undertone. Had their friend called them together to tell them at his ante-funereal banquet that his wife had run away with the old managing clerk, and that he would pass as pleasant an evening among them as the sad circumstances of his bereavement would allow, then order another turn-down of the gas, and blow his—— but at that instant the principal actor in all these proceedings called out in a full and cheery voice, "Friends and neighbours, double and single," here he coughed, and the more timid rose from their seats in preparation to run, as they feared that the dreadful tragedy was about to be enacted; but he went on, "Friends and neighbours, I have called you together to show you ten years of misfortune. A dead and painful silence prevailed, and the "dew-drops" rolled down many faces. "There they are!" he exclaimed, pointing to where there was a broad, green curtain about midway on one of the sides of the marquee. At the same moment out went the gas to a chorus of O! O! O!'s, and the green curtain parted in the centre to the strains of slow, delicious music, rising beneath a flood of light—"There they are, every one of them!" and there, surely enough, stood in a semicircle, banked by flowers of the choicest kind, Miss Fortune—that was—and ten charming children, she holding the youngest, a couple of months old, in her arms, bowing and smiling upon the wonder-struck spectators. The waving of handkerchiefs, clapping of hands, and huzzas that, in the enthusiastic language of festive newspaper gentlemen, "raised the roof of the building, and rent the air," may be faintly imagined, but any attempt at the barest description is far beyond the potency of a pen like mine. Whilst the gaslight was being restored, the host went to the extemporised stage and, amid volleys of plaudits, led Misfortune and her ten years to the head of the table. The ladies became almost hysterical with excitement; and although a large supply of eau-de-Cologne had been thoughtfully laid in, it was so generously "patronised" that the waiters muttered something to each other about the "sperrits from them ere scent-bottles a-catching the gas-lights." They, too, commenced a head-shaking concert on their own account, but nothing serious came of it.

In order not to disarrange the company, "Miss Fortune" and her ten years, contrary to all recognised etiquette—even the waiters paled with dismay at it—went round the table and received the congratulations of her friends. That having been done, the "years" retired, and their mother took her seat on the left hand of her husband. Here, again, was another "awful" breach of good manners; but it had the valuable comfort of enabling the visitors to look upon both host and hostess in one direction, which was just what they desired, instead of undergoing a craning swing of their necks from one end of the table to the other. A few friendly toasts were proposed, and corresponding speeches made—the most cordial being to the health of "Miss" Fortune and her ten years. Then there were interchanges of feelings and much laughter about the turning-down of the gas, what was to come next, &c. &c. A "good hour" passed in this way, when the host again rose and said,—

"Ladies and Gentlemen,—You have well deserved our heartfelt gratitude for the kindly way in which you have responded to our invitation. It may be that some of you have known misfortune in your time, but I do not think that any of you have had my special experience in that way. I have been more successful in life than, perhaps, I had a right or even a hope to expect; and, if I might not be considered guilty of a little vain-boasting, I have acted in business in the way that, no doubt, you have all acted. Whatever I undertook to do I endeavoured to do to the best of my ability. And here let me tell you—but this is in strict and secret confidence, mind you—that I have been ably and nobly assisted to my present position by—by Miss Fortune (roars of laughter). But my rule of conduct has not been entirely of my own creation, which, if you will spare me a few minutes' breathing to enable me to drink your good healths in return, I will exmplify by a singular but equally true story.

"Many, many, years ago, even before the last century was old enough to go into knickerbockers, at the corner of Cock Lane and Snow Hill of the olden time, before the railway station grew there, when the crystal Fleet river tumbled down from the northern heights into the silvery Thames, at the historical corner there lived, moved, and had his being, along with a sharp little wife and a noisy big family, a certain silversmith. *Laudatur temporis acti*—a praiser of the times past—let us be. Unto this silversmith there came one day a middle-aged man comfortably clad in the work-a-day costume of the period, and asked him if he could make models in tin and copper as well as in silver, according to drawings which were produced. Now the sharp little wife, who was always on the listen from the room overhead, where the family dwelt, shot her latest baby on to the bed, and herself down the rickety stairs like an arrow, and, before her manly husband could utter a word in reply, exclaimed, "Aye, that he can, better than any man in the City of London! It was only this very week that he made a six-quart copper kettle for Mr. Alderman Snoozle's wife; and I took it home myself, wrapped up in one of my best Sunday aprons, to the alderman's house in Austin Friars.' The two men looked at each other silently, the stranger scratching his wig with some of his spare fingers. An outburst of infantile music aloft took the small body away almost as quickly as she had come, and the conference was resumed. In about twenty minutes down she came again, arrayed in cap and curls—she had only just taken the last named out of paper—her Sunday gown, and ditto apron. Her sturdy husband looked upon her with real, pleasurable pride; in fact, he was lovingly fond of his morsel of womanhood; and the morsel knew that well, and she had glided into the belief, and acted upon it, that he could do nothing properly unless she had her 'say' in it. She made a most graceful curtsey to the stranger, and begged that he would step upstairs and have 'a dish of tea.' He, nothing loth, bowed and followed madam, and was ushered into a commodious, well-furnished room, ornamented with a comfortably laid tea-table, upon which silver was prominently shining—quite a contrast to the dingy place below. Two large windows looked into a small garden, whilst the greensward of Smithfield could be seen at no great distance, whither the elder children had been sent to play. A neat handmaiden was bustling about the tea-table; and when all three had taken their seats, the infant silver-blossom was handed to her, and she left the room. The stranger, in looking round, smiled, for upon the walls in nice frames were portraits of William and Mary, Queen Anne and Lord Godolphin—her Prime Minister. He went on with his tea, listening to his hostess, who was eloquent about the queen and about the Common Council and Aldermen of the city, and the city itself. And the little lady could talk! There was no hitch nor stammer, nor 'trying back' with her; like the Fleet river within sight of one of the windows, she could roll along a constant stream of loquacity. The stranger did not recommence his conversation about model-making, and it was evident to the smith that he desired to be alone with him. The latter thereupon made signals to his spouse, but she was not to be so easily disposed of. Wherever he was, and whatever he was talking about, she felt that she had a right to be there too, and to have her 'word in' as well. Acting upon that, she became suddenly stupid as to the meaning of his signs, and nods, and jerkings of his elbows, and so on; in fact, all his coughs and sneezings and signs were thrown away upon her, and for that matter he might as well have made them to the Sphinx of the Great Pyramid. But there were times occasionally when even the silversmith felt that he was the head of the family, and acted upon it. At length the stranger hastily drew his Tompion out of his fob, and rubbing the thumb of his left hand across the glass as he scanned the dial, breathed, as it were, into the smith's ear, 'Had I not better call in some other day?' That whisper electrified the smith, and he jumped up and motioned his by far stronger half to the door. 'Wife,' he exclaimed, in tones that she could not mistake, 'wife, hadst thou not better go into Smithfield and take the air along with the children? Dolly, the maid, will stay at home for thee: *I mean thee to do it.*' The little lady knew by the tone of his suppressed voice that he did mean it. Experience had taught her that much; furthermore, experience had also taught her that it would have been an easy matter for him to have whipped her up in his arms and landed her with all gentleness upon the door-step, Dolly following with her hat and cloak. None knew better than she when the limit had been reached, and when the time came to beat a 'masterly retreat.' So she gave the soft answer that turneth away wrath, went into the kitchen, left a few directions with Dolly, and reappearing in hat and cloak before her husband and his strange visitor, told them whereto she was going, and that Dolly would gladly attend to all their wants, and curtsied herself out of the room. A significant 'Hem, hem!' caused her husband to follow her; and when he got upon the landing, she pulled the room door to a close, and, springing upon her little tip-toes, flung her arms round his neck and kissed him several times. 'She hoped that he would look over it, and she would never do so again. It was very stupid of her, so it was, not to leave the room when he first wanted her to go; but it shall not happen any more, &c., &c., &c. Ah, the little story-teller! Why, they had been married some dozen years or so; she generally managed to have 'tiffs' of one kind or another about once a month, and this was always how they ended. 'She would never, never, do so again; it should not happen any more'; and all the rest of it.

"When they were alone, the stranger unfolded some drawings that a man-servant had carefully carried, and he asked the silversmith if he could work from them. The latter replied, 'that he could,' but he was unable to name a price. The stranger answered, 'We shall not fall out about the price, if you will only do what I tell you. But that has been my difficulty all along. Workmen will insist in *thinking* for me, and in making the models as they please; so that I have been nearly driven to despair. You work according to my plans and orders, and it shall fare you well. As you see by the drawings, I am interested in ships of various kinds, and I want to find out which form of model will sail fastest. I am having them now made of copper, because if I went to a regular model-maker, down by Wapping or Redriff, he would be curious to know my business; and that I will not allow. On the other hand, should I be seen coming in to you, nobody would suspect my errand; and, as I have said, if you follow my advice and keep my secret, it shall fare you well.'

"And having thus delivered himself, the stranger took his departure. But he had only been gone time enough to enable the drawings to be locked away, when in rushed the silversmith's wife, quite out of breath. 'Oh, Jacob, Jacob,' she exclaimed in gasps, 'that stranger is a man of quality, I am sure; for I saw him get into a hackney coach, and his man-servant get up beside the driver.' 'Did he see you?' asked Jacob, nervously. 'No, that he didn't,' said she, for when I saw him get into one of the best hackney coaches, and have a man-servant, my heart told me that he was one of the higher gentry; maybe from the queen's court. When I placed my eyes upon him, I drew the hood of my cloak over my head, and got behind a Fleet porter, so that there was no chance of his seeing me.'

"'Thou art a dear, thoughtful, good wife—worth thy weight thrice over of gold from the mint. Let me kiss thee for a brave wench.'

"'There is something in this, I tell thee, Jacob; and if any of our neighbour-folk should seek to know who he is when he comes again, tell them that he is an uncle of mine from Hampshire, who is a hog-breeder; and that, having to come to London about the lease of his farm, he has called upon thee to get him a copper to boil pigs' feed in.'

"And so that was settled. The stranger came about twice a week, and he expressed great satisfaction with the silversmith's work, and with the admirable way in which the instructions had been carried out.

"At length the settling day arrived, the last model having been delivered. The stranger, having had another 'dish of tea,' shook the little lady warmly by the hand, she never giving the least sign of what she thought him to be. As he was leaving, he carelessly threw a small bag-full of gold upon the table, saying, 'I hope that thou wilt find enough to pay thy husband for what he has done for me. I now know that thou keepest the purse, and so I hand it over to thy care;' and away he went.

"'Jacob, Jacob!' she exclaimed, with tears in her eyes, which were shared with the corners of her apron, as she tumbled the glittering guineas out of the bag upon the tea-board, 'I think now, Jacob, that there will be some hope of getting one of the boys into the Bluecoat School.'

"A great deal passed in the way of public events, and in less than two years the silversmith, by the aid of the mysterious stranger, made a large fortune at a stroke, in taking the contract for the silver services of the numerous messes of the officers of the Royal Navy.

"The stranger was a member of the Board of Admiralty, and the silversmith was Jacob Arguross, sometime an alderman of the city of London—AND MY ANCESTOR."

C. Stuart Murray.

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WEIGHTS AND MEASURES ACT.

On another page will be found an important communication on the above subject from Mr. R. Pringle, of Clerkenwell Road, to which we would especially call the attention of our readers.

Lathes for the Use of Watchmakers, Jewellers, &c.

Invented by Herman Milton Potter of Williamsport, Pennsylvania, United States of America.

This invention consists in lathe attachments for supporting, steadying and marking various small articles of steel, brass, iron or other material, and for securing the accurate turning or drilling of the same in any lathe to which the attachment may be applied. The attachment which is more particularly designed for watchmakers' or jewellers' use, combines in one device what may be termed an adjustable dead centre and an adjustable countersunk centre, the uses of which are dependent upon the description of work under operation. These centres comprise slides or their equivalents, which, as well as the attachment as a whole, are adjustable to the work or article under operation to support and allow the free rotation of the article without binding.

Among some of the uses to which the attachment may be applied by watchmakers are centre drilling, pivot turning, staff turning, pinion turning, the pinning of pinions and staffs, also as a gauge for cutting small articles into accurate lengths. The body of the lathe attachment has a centre hole or eye and adjustable slides arranged radially in the body around said eye, so that the ends of the slides will support the work to be operated on and passing through the eye, without binding. Ordinarily three slides arranged at equal distances apart will suffice, but four or any greater number may be used, if desired. These slides constitute work supporters, and need not necessarily be constructed in the form of slides, so long as they operate to centre and support the work under operation. It will be convenient, however, here to refer to such devices as slides. Said slides are operated in and out simultaneously as follows:—

The inner ends of the slides moving in the radial grooves are each provided with a V-shaped point having a flattened end, the V-shaped points of the slides flattened at their ends, supporting the article to be turned, without binding. The body of the lathe attachment has inserted within its face an eccentric slide-adjusting device which consists of a concentric ring having an attached lever or handle and a series of eccentric slots within which fit studs on the back of the radial slides, said slides being arranged in front of the device. The eccentric slots have branches at their outer ends opening outwards through the device to form outlets for the studs on the back of the slides when withdrawing or removing said slides from the body of the attachment. According as the lever or handle of said adjusting device is moved to the right or left will the several slides be simultaneously and quickly set in or out relatively to the centre hole or eye to adjust them to the work to be steadied and guided by the attachment, and after the necessary adjustment has been made the device is secured in position by a locking nut on the back of the body arranged to fit a pin on the device passing through a slot in the body. The body is secured to the back end of a bottom support or sliding block by clamping nuts on the back of the body and arranged to fit screw pins projecting from the rear end of the block and passing through slots in the body. This connection of the body with the block provides for an exact adjustment of the body up or down or about the pins. Such connection too provides for reversing the body which is countersunk at its eye on its back, to adapt it to plain or countersunk work according as its face or back is foremost. The bottom support or block has bevelled sides, and is arranged to fit or slide within a lathe block that fits and is capable of adjustment along the lathe bed, and is secured in position thereon by a thumb-screw, nut and bolt. An adjusting screw having a plain collared bearing within the lathe block and fitting a screw thread in

FIG. 1.

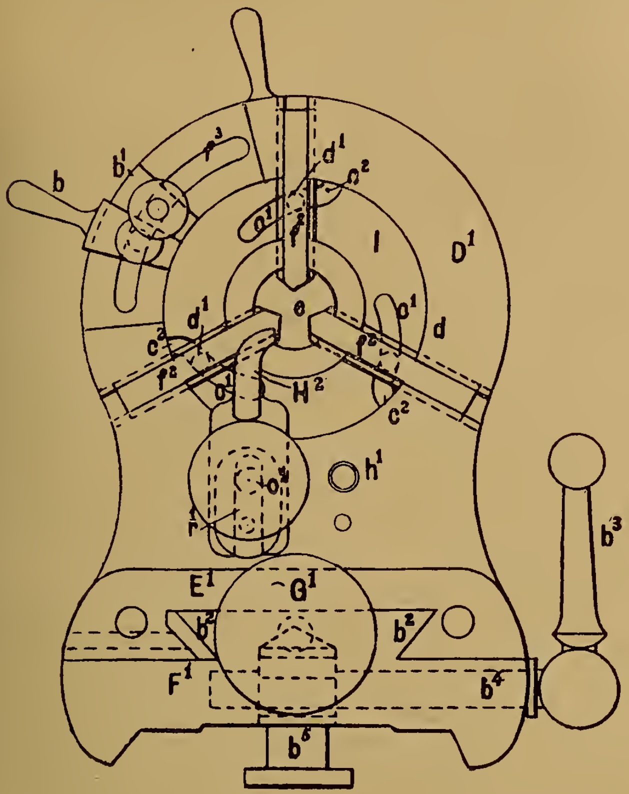

b
b^1
f^3
d^1
c^2
o^1
f^2
I
D^1
e
d^1
o^1
d
c^2
f^2
f^2
o^1
H^2
c^2
h^1
o^1
r
b^3
E^1
G^1
b^2
b^2
F^1
b^4
b^5

FIG. 2.

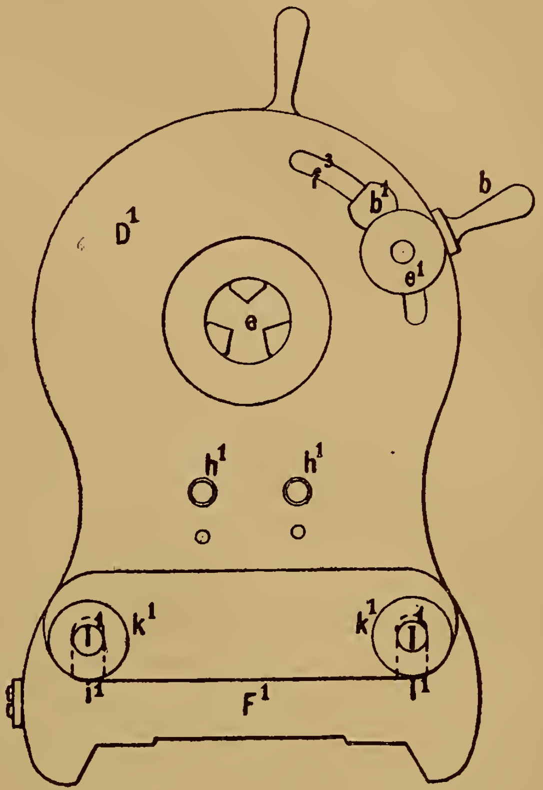

f^3
b^1
b
D^1
e^1
e
h^1
h^1
k^1
k^1
i^1
F^1
i^1

FIG. 3.

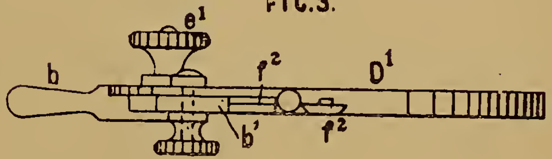

e^1
b
f^2
D^1
b'
f^2

FIG 4.

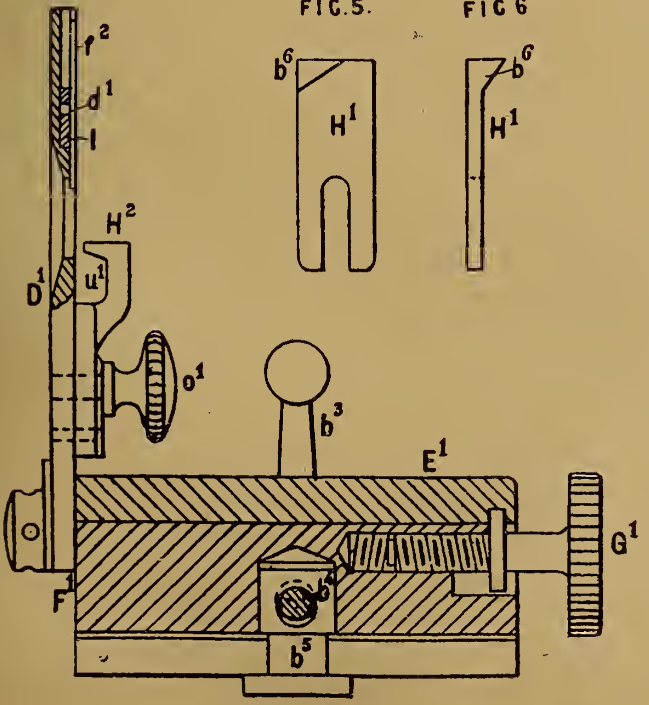

f^2
d^1
I
H^2
D^1
u^1
o^1
b^3
E^1
G^1
F^1
b^6
b^5

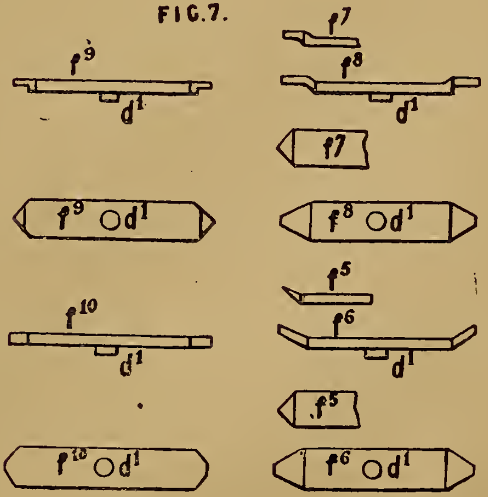
FIG. 5.

b^6
H^1

FIG 6

b^6
H^1

FIG. 7.


f^7
f^9
f^8
d^1
d^1
f^7
f^9 Od^1
f^8 Od^1
f^5
f^{10}
f^6
d^1
d^1
f^5
f^{10} Od^1
f^6 Od^1

the sliding block provides for the gradual adjustment of the attachment or its body in line with the spindle or work.

One form of tool-rest is secured to the body by a thumb-screw arranged to pass through an oblong slot and to enter a screw hole therein, and is set in or out from the body by means of set screws. This tool-rest, which is applicable to special kinds of work that the other rests are not adapted to, is formed with a hollow on its face to allow of certain kinds of work passing between it and the body of the attachment.

Another form of adjustable tool rest may be employed on the side of the body on which the centre hole is countersunk, and this tool-rest consists of a plate provided with a slot, for attachment at one of two poles in the body and adjustment of the rest, and a tapering projection at one of its corners constructed to enter within the countersunk surface of the eye and to conform thereto.

For countersunk work slides may be used having their end turned up or out, the one end being made bevelling in every direction and being applicable to single countersunk work, while the opposite end is of uniform thickness, with its sides bevelling so as to terminate in a flat or blunt extremity to adapt it to different or double countersunk work. These slides are adjusted in the same manner as those first described.

The Invention is illustrated in the accompanying drawings.

Figures 1 and 2 are front and back or opposite face views, upon an enlarged scale, of the attachment ready for support on and connection at its base with a lathe-bed, showing also certain details connected with it. Figure 3 is a top view of the same, and Figure 4 a mainly central vertical section thereof, transversely to the face of the attachment. Figures 5 and 6 are face and edge views of a tool rest used on the attachment, and Figure 7 face and edge views of different constructions of adjustable work centreing and supporting slides.

D^1 represents the body of the lathe attachment having a centre hole or eye e and adjustable slides f^2 arranged radially in the body around said eye so that the inner ends of the slides will support the work to be operated on and which passes through the eye without binding. Ordinarily three slides, arranged at equal distances apart will suffice, but four or more if desired may be used. These slides constitute work supporters and need not necessarily be constructed in the form of slides so long as they operate to centre and support the work under operation. It will be convenient here however to refer to such devices as slides. Said slides are operated in and out simultaneously as follows :—

The inner ends of the slides f^2 which move in radial grooves are each provided with a V-shaped point, the end of which may or may not be flattened, the several points collectively serving to support, without binding, the article to be turned. The body D^1 has inserted within its face an eccentric slide adjusting device I, which consists of a concentric ring having an attached lever or handle b and a series of eccentric slots c^1 within which studs d^1 on the back of the radial slides f^2 fit, said slides being arranged in front of the device I. The eccentric slots c^1 have branches c^2 at their outer ends opening outward through the ring or device I to form outlets for the studs d^1 on the back of the slides f^2 when withdrawing or removing said slides from the body D^1 of the attachment. Accordingly as the lever or handle b of said adjusting device I is moved to the right or left will the several slides f^2 be simultaneously and quickly set in or out relatively to the centre hole or eye e to adjust them to the work to be steadied and guided by the attachment, and after the necessary adjustment has been made, the device I if secured in position by a locking nut e^1 on the back of the body D^1 arranged to fit a pin on the device I passing through a slot f^3 in the body D^1. An adjustable stop b^1 secured by a nut and a pin arranged to pass through the slot f^3 may be applied to the attachment for limiting the closing action of the device I on the slides f^2, and a scale may be provided, if desired, for determining the proper position of such stop to suit different sizes of work.

The body D^1 is secured to the back end of a bottom support or sliding block E^1 by clamping nuts k^1 on the back of the body and arranged to fit screw pins l^1 projecting from the rear end of the block E^1 and passing through the slots i^1 in the body. This connection of the body with the block provides for an exact adjustment of the body up or down or about the pins l^1. Such connection, too, provides for reversing the body D^1 which is countersunk at its eye e on its back, to adapt it to plain or countersunk work accordingly as its face or back is foremost. The support or block E^1 is in sliding dovetail fit or connection as shown at b^2, b^2 with a lathe block F^1 that fits and is capable of adjustment along the lathe-bed, and is secured in position thereon by suitably turning through a handle b^3 on an eccentrically constructed locking shaft b^4 arranged to pass through a loosely fitting clamping block b^5 within the block F^1 said block b^5 having a head below for grip or hold on the lathe bed.

G^1 is an adjusting screw having a plain collared bearing within the block E^1 and fitting a screw thread in the lathe block F^1 to provide for the gradual adjustment of the attachment or its body in line with the spindle or work.

The tool rest H^2 shown in Figures 1 and 4 is secured to the body D^1 by a thumb-screw o^1 arranged to pass through an oblong slot r^1 and to enter one of a pair of screw holes h^1 according to which side of the body D^1 is foremost. It may be set in or out from the body D^1 by means of set screws. Said tool rest, which is applicable to special kinds of work that the other rests are not adapted to, is formed with a hollow u^1 on its face to allow of certain kinds of work passing between it and the body D^1 of the attachment.

Instead of the adjustable tool-rest H^2 an adjustable tool-rest H^1 as shown in Figures 5 and 6 may be employed on the side of the body D^1, on which the centre hole e is countersunk. This tool rest H^1 consists of a plate provided with a slot for the attachment at one of the holes h^1 and adjustment of the rest, and a tapering projection b^6 at one of the corners constructed to enter within the countersunk surface of the eye portion e and to conform thereto.

For countersunk work reversible slides f^5 or f^6 (Figure 7) may be used or substituted for the slides f^2 in the grooves in the body D^1 and be similarly adjustable by the same means. The slides f^5, f^6 are turned up or out at their ends, which may either be made bevelling in every direction as shown for the slide f^5 to adapt them to single countersunk work, or said ends may be of uniform thickness with the sides, bevelling so as to terminate in flat or blunt extremities, as shown for the slide f^6 to adapt the same for different or or double countersunk work. Besides these, there may be employed numerous other differently constructed work centreing and supporting slides, according to the changing character or shape of the work, certain of which marked f^7 f^3 f^9 and f^{10} are also shown in Figure 7. Each of these slides has a projection d^1 to engage with the eccentric slots c^1 in the adjusting device I.

Other details of this lathe-attachment may be variously modified, both as regards shape and otherwise, or other details may be added without changing the principle or character of the invention.

On page 31 of this Journal will be found the commencement of a Trade Marks Register, which will be continued monthly.

Electro-Plating with Nickel.

By William H. Wahl.

[A paper read before the Chemical Section of the Franklin Institute, and published in the Journal of the Institute.]

(*Continued from page* 16.)

WHERE a current of only moderate intensity is used, and which is uniformly maintained, these difficulties will be reduced to a minimum, and the solution will maintain itself in good working order for a long time, requiring only the occasional addition of a little sulphuric acid to correct any pronounced alkalinity that may be exhibited when tested, as it should be at frequent intervals, with test-paper. As metallic nickel is difficult of solution, the use of comparatively large anode surfaces is necessary, because the nickel dissolves so slowly that if the anode surface exposed in the depositing vat is not considerably larger than that of the objects on which the deposit is made, the solution will not keep saturated. There is another reason for the use of a comparatively large anode surface, which will appear further on.

From the preceding remarks it will be unnecessary, perhaps, to add that the double sulphate solution commonly used by nickel-platers presents greater difficulties in its employment than the acid solutions of Potts and others.

Again, the strength of the current should be carefully regulated according to the surface of the articles in the bath, as otherwise the work will be apt to "burn," that is, the metal will be precipitated as a dark grey or black deposit, which discolours and renders it useless. This is evidence of a current of too great intensity. To obviate this difficulty, the plan is generally adopted by careful operators of suspending a plate of nickel, presenting considerable surface at both ends of the rod from which the articles are suspended in the bath. By thus diverting the current the "burning" of the work is prevented.

As a general rule, it is well to observe that, other things being equal, the slower the rate of deposition, the more adherent and tenacious the coating of deposited metal will be. Where the metal deposits too rapidly, the deposit is apt to be brittle, and to exhibit, especially in the case of a heavy coating, a tendency to split and flake. This is due to the liberation of hydrogen at the cathode, and which is occluded by the electro-deposited metal. To obtain satisfactory results, it is important that the articles should be "struck," that is, receive a uniform coating immediately after they are immersed in the bath. This is an indication that the articles have been properly cleaned, and are in a proper condition to receive the deposit, and also that the bath is working properly. After this first layer has been deposited, the subsequent rate of deposition is much slower, for the reason that the deposit of nickel on nickel does not take place as readily as upon a foreign metal—a rule which appears to hold good of all metals.

Nickel solutions are feebler conductors of electricity than those of gold, silver, and copper, which is one of the reasons why its electro-deposition is attended with more difficulties than are experienced with the metals named. On this account, also, it is necessary to employ stronger depositing solutions than those used for gold and silver, and a stronger current. To make up for this want of conductivity it is advantageous to use a much larger anode surface than is customary with other metals, and it is necessary to place an anode on both sides of an article to be plated. The usual arrangement with a large vat is to have two rails of brass, the whole length of the vat, resting on the edges of the same, from which two rows of cast or rolled nickel anodes (to which copper wires are soldered) are suspended. Between these outer rods is placed a similar one, also running the whole length of the vat, and from this, by means of suitable slinging wires, the articles to be plated are suspended in the bath. The ends of the rails nearest the battery or dynamo are suitably connected therewith in the usual manner. The work thus hangs between the two rows of anodes.

Watt* very properly calls the attention of the operator in this connection to the importance of having the wire supports from which the articles are hung in the depositing vat, of a gauge suited to the character of the work. Small articles will require but a very thin wire, while larger ones will require correspondingly thicker "slinging wires." On the same point he cautions the operator that the difference of conductivity in the metals to be plated is to be considered, "for whereas a steel, brass, or copper article would become readily 'struck,' even if suspended from the conducting rod by a thin wire, articles of lead, Britannia metal, pewter, or even cast iron would not receive the deposit so readily." It is obvious, therefore, that in suspending articles in the plating bath, the operator must be guided in the matter of the thickness of the "slinging wires" by the nature of the articles, as well as by their dimensions.

It cannot be too strongly impressed on the operator that the attainment of success in nickel-plating depends very largely upon the perfect cleansing of the articles before they are immersed in the bath. Important as this operation is in plating with other metals, it is even more so in the case of nickel. Gilding, silvering, bronzing, etc., are usually effected with solutions having a decidedly alkaline character (reference is made here to the double cyanide solutions commonly used); and the presence of minute traces of oxide from careless exposure to the air after cleansing, or of grease from the fingers, etc., on the surface of the articles to be plated, is not necessarily fatal to the success of the work, as the free cyanide always present in those baths, being a solvent of greasy substances and of metallic oxides, may remove trifling quantities of such impurities. With nickel, however, the case is different. The solutions employed for its deposition are either neutral or weakly alkaline or acid. Their chemical character is such, therefore, that they can have little or no solvent effect on the grease or oxide left on the articles by careless cleansing, or improper handling, or exposure before immersion; and if such articles are plated, the nickel coating at the unclean places will be found to have little or no adhesion to the metal beneath, and will almost certainly flake or strip at these places in the subsequent operation of buffing. Unless the surfaces to be coated are *chemically* clean, an adherent deposit of nickel is simply impossible.

(*To be continued.*)

◆

The church at Ombersley, Worcestershire, has just been enriched by having a very large chiming clock erected in the tower by Messrs John Smith & Sons, Midland Clock Works, Derby. It has four dials, each 6 feet across, chimes the Cambridge quarters upon four bells, and strikes the hours upon a 20-cwt. bell. It has been constructed generally to the plans as recommended by Sir Edmund Beckett Denison, having a gravity escapement and a 2 cwt. compensated pendulum; a chiming apparatus has also been fixed to chime on the whole of the bells.

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* Watt, "Electro-Metallurgy" (7th ed.), p. 101 *et seq.*

Guide to Calculate the Value of Gold and Silver after the various Assay Reports.

By H. Bush, Hull (*All rights reserved*).

Continued from page 35, Vol. IX.

Practical Hints, Tables, and Rules, for Alloying the various Gold Standards recognised by the Goldsmiths' Hall, London, and the Provincial Assay Offices.

IN order to obtain reliable results in the alloying of gold, with regard to the required fine contents of the various standards and uniformity of colour, it is absolutely necessary to use either assayed bars of known composition, or refined gold—which is, however, not in all cases fully reliable as to fine contents and malleability—or *coin gold*, which better answers the purpose, and is, as a rule, more easily obtained. It is, however, advisable to cut the coin up before melting, and carefully compare the colour of the cut with the surface of the coin, as good platinum-alloyed imitations of gold coins have been found in circulation, which, having the ring, weight, and volume, and being gilt to assume the surface-colour of the genuine coin, cannot be detected unless cut up and carefully observed.

A proportion of two parts of sterling silver and one part of copper makes a good alloy for adding to the coin gold.

A good solder for 18-carat gold is formed by taking for a hard solder twenty-two parts of sovereign gold, twelve parts of sterling silver, and twelve copper; for a softer solder, add to hard solder from three to six parts of brass.

A good solder for 15 and 12-carat gold is prepared by taking either three parts of clippings of the gold in manipulation and one part of sterling silver, or two parts of gold clippings and one of sterling silver, or equal parts of each; for a good soft solder, add half a part of brass.

A good solder for 9-carat gold is made of equal parts of sovereign gold, sterling silver and brass, and one-sixth part of zinc.

Alloy Tables for Preparing the Standards of 18-*carat*, 15-*carat*, 12-*carat, and* 9-*carat Gold, from British Coin Gold* (*Table A*), *and American, French, and German Coin Gold* (*Table B*).

TABLE A.—FOR BRITISH COIN GOLD.

Weight of Sovereign Gold, ·916.			Amount of Alloy to be added for—																
			18-Carat, ·750.				15-Carat, ·625.				12-Carat, ·500.				9-Carat, ·375.				
Old Troy Weight.		Decimal.	Dwts.	Grs.		Decimal.	Dwts.	Grs.		Decimal.	Dwts.	Grs.		Decimal.	Oz.	Dwts.	Grs.		Decimal.
½ grain	=	·001	0	⅛	=	—	0	¼	=	—	0	½	=	·001	0	0	⅔	=	·002
1 ,,	,,	·002	0	¼	,,	—	0	½	,,	·001	0	⅚	,,	·002	0	0	1⅓	,,	·003
2 ,,	,,	·004	0	½	,,	·001	0	¾	,,	·002	0	1⅔	,,	·003	0	0	3	,,	·006
3 ,,	,,	·006	0	⅝	,,	·002	0	1⅜	,,	·003	0	2½	,,	·005	0	0	4¼	,,	·009
6 ,,	,,	·013	0	1¼	,,	·003	0	2¾	,,	·006	0	5	,,	·010	0	0	8½	,,	·018
9 ,,	,,	·019	0	1⅞	,,	·004	0	4⅛	,,	·009	0	7½	,,	·016	0	0	12¾	,,	·027
12 ,,	,,	·025	0	2½	,,	·006	0	5½	,,	·012	0	10	,,	·021	0	0	17⅓	,,	·036
15 ,,	,,	·031	0	3⅛	,,	·007	0	6⅞	,,	·015	0	12½	,,	·026	0	0	21½	,,	·045
18 ,,	,,	·038	0	3¾	,,	·008	0	8¼	,,	·018	0	15	,,	·031	0	1	1¾	,,	·054
21 ,,	,,	·044	0	4⅜	,,	·010	0	9⅝	,,	·021	0	17½	,,	·036	0	1	6¼	,,	·063
1 dwt.	,,	·050	0	5⅓	,,	·011	0	11⅕	,,	·023	0	20	,,	·041	0	1	10⅔	,,	·072
2 ,,	,,	·100	0	10⅔	,,	·022	0	22⅖	,,	·046	1	16	,,	·083	0	2	21⅓	,,	·144
3 ,,	,,	·150	0	16	,,	·033	1	9⅗	,,	·070	2	12	,,	·125	0	4	8	,,	·216
4 ,,	,,	·200	0	21⅓	,,	·044	1	20⅘	,,	·093	3	8	,,	·166	0	5	18⅔	,,	·288
5 ,,	,,	·250	1	2⅔	,,	·055	2	8	,,	·116	4	4	,,	·208	0	7	5⅓	,,	·361
6 ,,	,,	·300	1	8	,,	·066	2	19⅕	,,	·140	5	0	,,	·250	0	8	16	,,	·433
7 ,,	,,	·350	1	13⅓	,,	·077	3	6⅖	,,	·163	5	20	,,	·291	0	10	2⅔	,,	·505
8 ,,	,,	·400	1	18⅔	,,	·088	3	17⅗	,,	·186	6	16	,,	·333	0	11	13⅓	,,	·578
9 ,,	,,	·450	2	0	,,	·100	4	4⅘	,,	·210	7	12	,,	·375	0	13	0	,,	·650
10 ,,	,,	·500	2	5⅓	,,	·111	4	16	,,	·233	8	8	,,	·416	0	14	10⅔	,,	·722
11 ,,	,,	·550	2	10⅔	,,	·122	5	3⅕	,,	·256	9	4	,,	·458	0	15	21⅓	,,	·794
12 ,,	,,	·600	2	16	,,	·133	5	14⅖	,,	·280	10	0	,,	·500	0	17	8	,,	·866
13 ,,	,,	·650	2	21⅓	,,	·144	6	1⅗	,,	·303	10	20	,,	·541	0	18	18⅔	,,	·939
14 ,,	,,	·700	3	2⅔	,,	·155	6	12⅘	,,	·326	11	16	,,	·583	1	0	5⅓	,,	1·011
15 ,,	,,	·750	3	8	,,	·166	7	0	,,	·350	12	12	,,	·625	1	1	16	,,	1·083
16 ,,	,,	·800	3	13⅓	,,	·177	7	11⅕	,,	·373	13	8	,,	·666	1	3	2⅔	,,	1·155
17 ,,	,,	·850	3	18⅔	,,	·188	7	22⅖	,,	·396	14	4	,,	·708	1	4	13⅓	,,	1·228
18 ,,	,,	·900	4	0	,,	·200	8	9⅗	,,	·420	15	0	,,	·750	1	6	0	,,	1·300
19 ,,	,,	·950	4	5⅓	,,	·211	8	20⅘	,,	·443	15	20	,,	·791	1	7	10⅔	,,	1·372
1 ounce	,,	1·000	4	10⅔	,,	·222$\frac{2}{9}$	9	8	,,	·466⅔	16	16	,,	·833⅓	1	8	21⅓	,,	1·444$\frac{4}{9}$

These tables offer the facility to mix a small quantity of any required standard without calculation, and are arranged to familiarise the user with the decimal system of troy weight, in accordance with the "Weights and Measures Act, 1878, 41 & 42 Vict. ch. 49," * which abolishes the division of the ounce troy by pennyweights and grains, substituting a decimal division of the ounce troy by thousandths, and which every refiner, manufacturer, and dealer in precious metals in the United Kingdom will ere long be compelled to adopt in course of trade transactions, but if once accustomed to will be found far preferable to the old troy weight division: the simplicity of the new system is fully demonstrated by the comparative figures in these tables.

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* In pursuance of the "Weights and Measures Act," I am prepared to supply the legal and stamped decimal weights, consisting of fifteen pieces, on receipt of 2s. 6d. per set.—H. Bush, Jewellers' Agent, Hull.

A similar advantage is manifested by the comparative figures in these tables in the decimal divisions of fine contents over the denomination of carats and sub-division.

TABLE B. — FOR AMERICAN, FRENCH, AND GERMAN COIN GOLD.

WEIGHT OF COIN GOLD, ·900.		AMOUNT OF ALLOY TO BE ADDED FOR —												
		18-CARAT, ·750.			15-CARAT, ·625.			12-CARAT, ·500.			9-CARAT, ·375.			
Old Troy Weight.	Decimal.	Dwts.	Grs.	Decimal.	Dwts.	Grs.	Decimal.	Dwts.	Grs.	Decimal.	Oz.	Dwts.	Grs.	Decimal.
½ grain	= ·001	0	$\frac{1}{10}$	= —	0	$\frac{5}{25}$	= —	0	$\frac{2}{5}$	= ·001	0	0	$\frac{7}{10}$	= ·002
1 ,,	,, ·002	0	$\frac{1}{5}$	,, —	0	$\frac{11}{25}$	,, ·001	0	$\frac{4}{5}$	,, ·002	0	0	$1\frac{2}{5}$	,, ·003
2 ,,	,, ·004	0	$\frac{2}{5}$	,, ·001	0	$\frac{22}{25}$	,, ·002	0	$1\frac{3}{5}$	,, ·003	0	0	$2\frac{4}{5}$	,, ·006
3 ,,	,, ·006	0	$\frac{3}{5}$	,, ·002	0	$1\frac{8}{25}$	,, ·003	0	$2\frac{2}{5}$	,, ·005	0	0	$4\frac{1}{5}$	,, ·009
6 ,,	,, ·013	0	$1\frac{1}{5}$	,, ·003	0	$2\frac{16}{25}$	,, ·006	0	$4\frac{4}{5}$	,, ·010	0	0	$8\frac{2}{5}$	,, ·018
9 ,,	,, ·019	0	$1\frac{4}{5}$	,, ·004	0	$3\frac{24}{25}$	,, ·009	0	$7\frac{1}{5}$	,, ·015	0	0	$12\frac{3}{5}$	,, ·027
12 ,,	,, ·025	0	$2\frac{2}{5}$	,, ·005	0	$5\frac{7}{25}$	,, ·011	0	$9\frac{3}{5}$	,, ·020	0	0	$16\frac{4}{5}$	,, ·035
15 ,,	,, ·031	0	3	,, ·006	0	$6\frac{15}{25}$	,, ·014	0	12	,, ·025	0	0	21	,, ·044
18 ,,	,, ·038	0	$3\frac{3}{5}$	,, ·007	0	$7\frac{23}{25}$	,, ·017	0	$14\frac{2}{5}$	,, ·030	0	1	$1\frac{1}{5}$	,, ·053
21 ,,	,, ·044	0	$4\frac{1}{5}$	,, ·009	0	$9\frac{6}{25}$	,, ·020	0	$16\frac{4}{5}$	,, ·035	0	1	$5\frac{2}{5}$	,, ·062
1 dwt.	,, ·050	0	$4\frac{4}{5}$	,, ·010	0	$10\frac{14}{25}$	,, ·022	0	$19\frac{1}{5}$	,, ·040	0	1	$9\frac{3}{5}$	,, ·070
2 ,,	,, ·100	0	$9\frac{3}{5}$	,, ·020	0	$21\frac{3}{25}$	,, ·044	1	$14\frac{2}{15}$	,, ·080	0	2	$19\frac{1}{5}$	,, ·140
3 ,,	,, ·150	0	$14\frac{2}{5}$	,, ·030	1	$7\frac{17}{25}$	,, ·066	2	$9\frac{3}{5}$	,, ·120	0	4	$4\frac{4}{5}$	,, ·210
4 ,,	,, ·200	0	$19\frac{1}{5}$	,, ·040	1	$18\frac{6}{25}$	,, ·088	3	$4\frac{4}{5}$	,, ·160	0	5	$14\frac{2}{5}$	,, ·280
5 ,,	,, ·250	1	0	,, ·050	2	$4\frac{4}{25}$	,, ·110	4	0	,, ·200	0	7	0	,, ·350
6 ,,	,, ·300	1	$4\frac{4}{5}$	,, ·060	2	$15\frac{2}{25}$	,, ·132	4	$19\frac{1}{5}$	,, ·240	0	8	$9\frac{3}{5}$	,, ·420
7 ,,	,, ·350	1	$9\frac{3}{5}$	,, ·070	3	$1\frac{24}{25}$	,, ·154	5	$14\frac{2}{5}$	,, ·280	0	9	$19\frac{1}{5}$	,, ·490
8 ,,	,, ·400	1	$14\frac{2}{5}$	,, ·080	3	$12\frac{13}{25}$	,, ·176	6	$9\frac{3}{5}$	,, ·320	0	11	$4\frac{4}{5}$	,, ·560
9 ,,	,, ·450	1	$19\frac{1}{5}$	,, ·090	3	$23\frac{2}{25}$	,, ·198	7	$4\frac{4}{5}$	,, ·360	0	12	$14\frac{2}{5}$	,, ·630
10 ,,	,, ·500	2	0	,, ·100	4	$9\frac{16}{25}$	,, ·220	8	0	,, ·400	0	14	0	,, ·700
11 ,,	,, ·550	2	$4\frac{4}{5}$	,, ·110	4	$20\frac{1}{25}$	,, ·242	8	$19\frac{1}{5}$	,, ·440	0	15	$9\frac{3}{5}$	,, ·770
12 ,,	,, ·600	2	$9\frac{3}{5}$	,, ·120	5	$6\frac{19}{25}$	,, ·264	9	$14\frac{2}{5}$	,, ·480	0	16	$19\frac{1}{5}$	,, ·840
13 ,,	,, ·650	2	$14\frac{2}{5}$	,, ·130	5	$17\frac{8}{25}$	,, ·286	10	$9\frac{3}{5}$	,, ·520	0	18	$4\frac{4}{5}$	,, ·910
14 ,,	,, ·700	2	$19\frac{1}{5}$	,, ·140	6	$3\frac{22}{25}$	,, ·308	11	$4\frac{4}{5}$	,, ·560	0	19	$14\frac{2}{5}$	,, ·980
15 ,,	,, ·750	3	0	,, ·150	6	$14\frac{11}{25}$	,, ·330	12	0	,, ·600	1	1	0	,, 1·050
16 ,,	,, ·800	3	$4\frac{4}{5}$	,, ·160	7	1	,, ·352	12	$19\frac{1}{5}$	,, ·640	1	2	$9\frac{3}{5}$	,, 1·120
17 ,,	,, ·850	3	$9\frac{3}{5}$	,, ·170	7	$11\frac{14}{25}$	,, ·374	13	$14\frac{2}{5}$	,, ·680	1	3	$19\frac{1}{5}$	,, 1·190
18 ,,	,, ·900	3	$14\frac{2}{5}$	,, ·180	7	$22\frac{3}{25}$	,, ·396	14	$9\frac{3}{5}$	,, ·720	1	5	$4\frac{4}{5}$	,, 1·260
19 ,,	,, ·950	3	$19\frac{1}{5}$	,, ·190	8	$8\frac{17}{25}$	,, ·418	15	$4\frac{4}{5}$	,, ·760	1	6	$14\frac{4}{5}$	,, 1·330
1 ounce	,, 1·000	4	0	,, ·200	8	$19\frac{6}{25}$	,, ·440	16	0	,, ·800	1	8	0	,, 1·400

For alloying a small quantity of any standard, reference to the tables will indicate at sight the proportions of coin gold and alloy required: for instance, 10 dwts. = ·500 ozs. of 9-carat gold is required to be alloyed from sovereign gold, we note from the Table A—

4 dwts. 2 grs. = ·204 oz. sovereign gold,
and add 5 ,, $21\frac{2}{3}$,, ,, ·295 ,, alloy,
realizing 9 dwts. $23\frac{2}{3}$ grs. = ·499 oz. 9-carat gold.

Or, 10 dwts. = ·500 ozs. of 9-carat gold is required to be alloyed from American, French, or German coin gold, we note from Table B—

4 dwts. 4 grs. = .208 oz. coin gold,
and add 5 ,, 20 ,, ,, ·292 ,, alloy,
realising 10 dwts. 0 grs. = ·500 oz. 9-carat gold.

For alloying larger quantities the calculation is simplified by using the rule adopted in the following examples, viz.: 45 ozs. 15 dwts. 21 grs. sovereign gold to be alloyed to 15-carat gold, we convert the quantity into decimals, viz.—

45 ozs. = 45·000, 15 dwts. = ·750, 21 grs. = ·044, making 45,794, and multiply by the difference of carats between sovereign gold and the standard to be alloyed, viz., 22 — 15 = 7 × 45794 = 320558, and divide the product by the carats of the required standard, viz.—

15) 320558 (21·370 = 21 ozs. 7 dwts. $9\frac{4}{5}$ grs. alloy,
to be added to 45·794 ,, 45 ,, 15 ,, 21 ,, sovereign gold,
realising 67·164 = 67 ozs. 3 dwts. $6\frac{4}{5}$ grs. 15-carat gold.

Or, 45 ozs. 15 dwts. 21 grs. American, French, or German coin gold, to be alloyed to 15 carat gold—

We multiply the quantity of decimals of the coin gold by the difference of its fine contents in thousandths, and the fine contents of the standard to be alloyed, viz., ·900 — 625 = 275 × 45794 = 12593350, and divide the product by the fine contents of the standard to be required, viz.—

625) 12593350 (20·150 = 20 ozs. 3 dwts. 0 grs. alloy,
to be added to 45·794 ,, 45 ,, 15 ,, 21 ,, coin gold,
realising 65·944 = 65 ozs. 18 dwts. 21 grs. 15-carat gold.

The same rule may similarly be employed for compounding alloys of any standard or quality, so as to produce exact results; for instance, we have 36 dwts. of 9-carat gold, which we want to bring up to 12, 15, or 18-carat by adding either British or American coin, we proceed in the following manner:—

36 dwts. = 1·800 of 9-carat gold to be raised to 12-carat by adding British coin or 22-carat—

Multiply the given quantity by the difference of carats between 9 and 12-carat = 3 × 1800 = 5400, and divide the product by the difference of carats of 12 and 22-carat =

10) 5400 (·540 = 0 ozs. 10 dwts. 19 grs. of sovereign gold,
to be added to 1·800 ,, 0 ,, 36 ,, 0 ,, of 9-carat gold,
realising 2·340 = 2 ozs. 6 dwts. 19 grs. of 12-carat gold,

Or, 36 dwts. = 1·800 of 9-carat gold to be raised to 12-carat by adding American coin or ·900 fine—

Multiply the given quantity by the difference of fine contents in thousandths of 9-carat (·375) and 12-carat (·500) = 125 × 1800 = 225000, and divide the product by the difference of fine contents of 12-carat (·500) and coin gold (·900) =

·400) 225000 (·562 = 0 ozs. 11 dwts. 6 grs. of American coin gold,
to be added to 1·800 ,, 0 ,, 36 ,, 0 ,, of 9-carat gold,
realising 2·362 = 2 ozs. 7 dwts. 6 grs. of 12-carat gold.

(To be continued.)

Correspondence Column.

WEIGHTS AND MEASURES ACT.

TO THE EDITOR OF THE "WATCHMAKER, JEWELLER, AND SILVERSMITH."

Sir,—I am glad to learn, by the letter from H. B. in your last issue, there is one person at least who is satisfied, and even gratified, at the action of the authorities in the above matter.

To start with his opening remarks, he appears to rejoice in seeing others "made mutton of" in order to nourish the rest, provided the lot does not fall on himself or his friends. This we can stand; but, with respect to our defence, I must make a remark or two. H. B. speaks of it "as being very lame and entirely inadmissible;" he holds us up as being ignorant of a law which came into operation over five years ago, and speaks of us as if we had never seen a decimal weight, and were keeping our "subs" in the same benighted condition.

I beg him to read once again the report of the proceedings, especially with regard to ourselves; and it was much the same with the other defendants. Why, the chairman assumed that I had (through my solicitor) pleaded ignorance, agreeable to the above remarks, which I at once denied with scorn; and the very statement that I possessed that knowledge, and had made an effort to comply with the law from its coming into operation, was made the reason for my conviction. What I object to, and I believe all the other defendants object to, is that, for the first time in the memory of any one of us, an Act was enforced without fair notice—an Act that is one of the loosest ever passed, so much so that one of the best and most experienced scale-makers told me he could pick it to pieces all over—an Act that in some of its provisions could be interpreted to mean almost anything, and one that sadly requires amending. It is an Act which I shall be able to prove that those who have the enforcement of, have proved themselves incapable of doing. I will explain what I mean. Those who live in glass houses should never throw stones. If a tradesman who is found with a 3 oz. weight in his possession, and that weight should be half a grain light (which is equal to one grain in fourteen hundred), the law, which should protect him if he be not acting fraudulently, is put into operation to fine and disgrace him; he is held up to the public as one fined for unjust weights, no matter if he uses those weights mostly, or even exclusively, for transactions between himself and his own work-people, or for buying for himself, in which case he cheats himself—the difference being less than one in a thousand, and consequently not worth his notice. Now, I say, is not this a misapplication of the law—an applying of it to a purpose for which those who framed the same never intended it? And who is benefited? Neither master, man, nor the public. Who is? Why the inspector, of course, because in Middlesex he gets half the amount of the fines. Now, what capability of doing their work do these inspectors show? I really expected that such men would be perfect—those who are entrusted with the administration of such a fine law that they will allow no error at all in deficiency—at least not one grain in fourteen hundred. But what do we find?—and this is a statement that I am prepared to verify and to stand by. That new weights stamped by an inspector in one district (Birmingham) as quite correct have been taken almost straight to an inspector in another, and nearly the whole set condemned by him as being incorrect; and no doubt had the same inspector called and found these weights in use, he could have seized them, and the owner would have been fined and disgraced. (These identical weights can be seen at Wilderness Works.)

Of course the moral is—Take your weights to your own district inspector, and pay the fees to him; that is, if he is in a position to examine them, which many of them are not. So much for the capability of our inspectors.

Then, again, with respect to the remuneration of the inspector, in Middlesex and I believe there only, or almost so, the inspector gets half the amount of the fines. On the occasion of the raid recently made on the jewellers of Clerkenwell, he received £18 5s., the whole amount of the fines having been £36 10s. This method of paying the inspector is generally disapproved of by the Board of Trade, and has been abolished by the magistrates in other counties, as having a tendency to encourage them to manufacture crimes, to harass men, who, like the jeweller-defendants, were told by the magistrates they were not guilty of any fraud; in fact, it compels them to enforce the law by making a trade of disgracing others, instead of inducing them to lend their assistance in keeping them right. I say that the magistrates should glory rather in the "white gloves" than in the fines; but I am not sure if they do so, for on looking over my paper this morning (*Daily Chronicle*, July 25th), in a report of a meeting I find it stated, "The result has been very satisfactory, for the fines have amounted to £56 over those inflicted during the previous six months; the county (?) has therefore obtained a substantial money gain." I ask, has the county gained, even in money, if its traders have been harassed and tripped up for the benefit of inspectors, when, had the system been different, these very men might have been an assistance, and being public servants should be so?

Then, again, this law is not enforced with uniformity; it is administered differently in different counties, and differently in two parts of the same town, if the town happen to be, as London is, in more than one county. Carry on business as a jeweller in Clerkenwell, which is in London, but in Finsbury, and you and your Troy weights are inspected to death; open a shop in Deptford or Woolwich, which is also in the metropolitan district, and, desiring to be honest, send your Troy weights to the inspector, as a friend of mine did, and they are returned to you with the information that the inspector has no means of trying them; is it not absurd?

Once, again, under this Act the inspectors are charging all sorts of prices. If I want a set of Troy weights stamped in Middlesex, the fees are much more than in Birmingham; and I am charged twopence for stamping a 1-oz. weight in one part of London and only one halfpenny for doing the same work in another part of London, both inspectors working under the same Act. I say, Mr. Editor, that such an Act, and the way it has been administered, are simply absurd, and the sooner it is repealed or amended the better. It may be all very well for costermongers and the lower order of tradesmen; but when inspectors appear amongst a class of men like jewellers, silversmiths, and watchmakers, they should be backed up with something that will better stand inspection. Let them keep amongst those for whom they were created: it is an insult to send them amongst us: we can do very well without them until they can work with more uniformity and correctness, and, in the meantime we shall not do much harm by cheating a poor man when he asks for a pound of gold, for that is a thing he never does; or by giving too good weight in strychnine, for that is an article jewellers have not yet gone in for, despite the opposition of the "Stores." After this little explanation you will see, Mr. Editor, I am not so pleased about the Weights and Measures Act enforcement as friend H. B.

Yours obediently,

Robert Pringle.

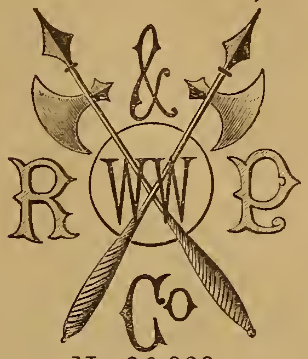
Wilderness Works, Clerkenwell, London, E.C.

R. PRINGLE & CO.,

Wilderness Works,
42, CLERKENWELL ROAD,
LONDON, E.C.

Established Fifty Years.

Registered 20th March, 1882.



No. 26,839.

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AMERICAN WATCH CO.,

WALTHAM, MASS.

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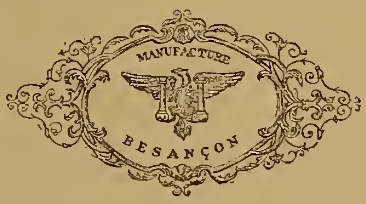

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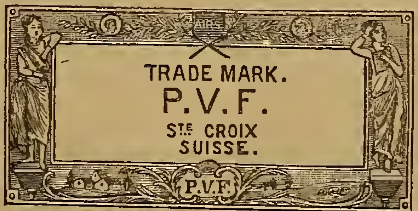

TRADE MARK.
P.V.F.
STE CROIX
SUISSE.
P.V.F.

Registered 2nd Sept., 1878.
No. 15,227.

Manufacturers of English & Swiss Watches and Musical Boxes.

WATCHMAKERS' GRIEVANCES.

TO THE EDITOR OF THE "WATCHMAKER, JEWELLER, AND SILVERSMITH."

Sir.—The evidence of your correspondent, Mr. W. H. Huddy, on the certificate question as a matter of principle affords me great satisfaction, though, on the point of its narations, I beg you to permit me to add a few particulars.

If I thought it was of sufficient interest to your readers, I could show beyond controversy that as early as 1869 I brought this measure, (as the City and Guilds of London Institute now has it) to the consideration of the members of the British Horological Institute; but the opposition I encountered completely neutralised my efforts, and the matter would have remained as it was left then, had it not been for the City and Guilds Institute.

I have no wish to detract from the praise your correspondent thinks is due to the Horological Institute for the work it is doing; but it is also a matter of statistics that up to May, 1883, the Horological Institute has had four students pass the City and Guilds examination at a cost of over £120, or £30 per individual student, while in the same period I had twenty-nine pass at a cost of £42, or £1 8s. per individual student. Nor is this all. Their only teacher that has had any result is a graduate of my classes, and so is one of their judges.

Thanks to Mr. Quinton Hogg, for his munificence will enable me to turn my attention to the practical. In a few weeks a school of practical, as well as theoretical watch and clock making, will be in operation at the Polytechnic, Regent Street, which I hope will satisfy every possible requirement. It is in the interest of this scheme and its promoters that I thought it due to add such particulars as I think Mr. Huddy's letter demanded.

Yours etc.,
J. Herrmann.

◆

The "Hall-Marking Question" in Germany.

(*Continued from page* 11.)

THE Bill, prepared by a Commission on the above subject, passed its third reading in the "Reichstag" on May 13th, and was virtually accepted.

Though, according to the organ of the "Central Union of German Watchmakers," it may have to undergo some further "pruning," before its "fruitfulness" is thought to be ensured by the German "Law-dressers," yet so little change, as to its present form, is expected by our contemporary, that it treats its legality, as it now stands, as a mere question of time, and proceeds, critically to review its provisions; and especilaly so, because this new "legal sausage" is not of a form as ordered by the petition alluded to in last number.

Agreeing, however, that this change was necessary in the interest of "law," and rejoicing in the fact that, after all, they (the Union of Watchmakers) got their "turn served," it proceeds to give such paragraphs or clauses that have mostly reference to gold and silver watch-cases, thus:—

Sect. 2.—"In gold utensils, the fine alloy may only form 585 or more thousandth parts; and in silver utensils, only 800 or more thousandth parts. The virtual fine alloy may not (the whole or any part) be lower than five in gold utensils, and eight thousandth parts in silver utensils, inclusive of solder."

Sect. 3.—"The certification of the 'fine alloy' in gold and silver utensils to be effected by a stamp, showing the number of the thousandth parts, and the name of the firm for whom the stamping is performed. The form of the stamp to be determined by the 'Bundesrath' (Council of the Union)."

Sect. 4.—"Gold and silver watch-cases are included in paragraphs 2 and 3."

Sect. 6.—"Imported articles of gold or silver, whose fine alloy is not certified according to the demands of this law, may only then be offered for sale, when an additional stamping, according to the provisions of this law, has been effected."

Sect. 7.—"The seller of an article, is responsible for the stated alloy of fine gold. If it has an inland stamp, the firm for whom it has been stamped, as well as the seller, is responsible."

Sect. 8.—"On gold and silver articles, which are loaded with other metal, the fine alloy may not be stated.

"This refers to such gold and silver articles, which are united with other metal to protect them against change of form."

Sect. 9.—"By a fine of one thousand marks, or imprisonment of six months, is punishable—

"Who offers for sale, goods which are marked contrary to the provisions of this law.

"The conviction includes the erasement of the illegal mark, or, if not possible, the destruction of the article itself."

Sect. 10.—"This law to come into force on the 1st of January, 1888."

"It is especially gratifying to us," so says our contemporary, in its review of these clauses, "that this law, notwithstanding the many difficulties besetting it, in the main answers our desires. On consideration of the complaints, it appeared evident that they presented considerable complexities, and were in no way so simple, as it had been thought at legal centres." Evidently, the watch-makers and jewellers of Germany present "hostile fronts" on this question; for the article further says, "the protest of a great section of the gold and silver industries against the original 'legal programme' was so strong, and in order to do justice to all the interests concerned, without injury to any particular industry, the difficulties were so great, that for a time the possibility of legal measure, seemed doubtful."

It is, however, noteworthy, that according to the statement of the Commission, the "counter petition" had exclusive reference to jewellery. Thus this new law refers essentially to plate, in which watch-cases are included, and not to articles of jewellery, and thus practically brings the law to the standard as it now is in England, plus its regulation regarding imported watches.

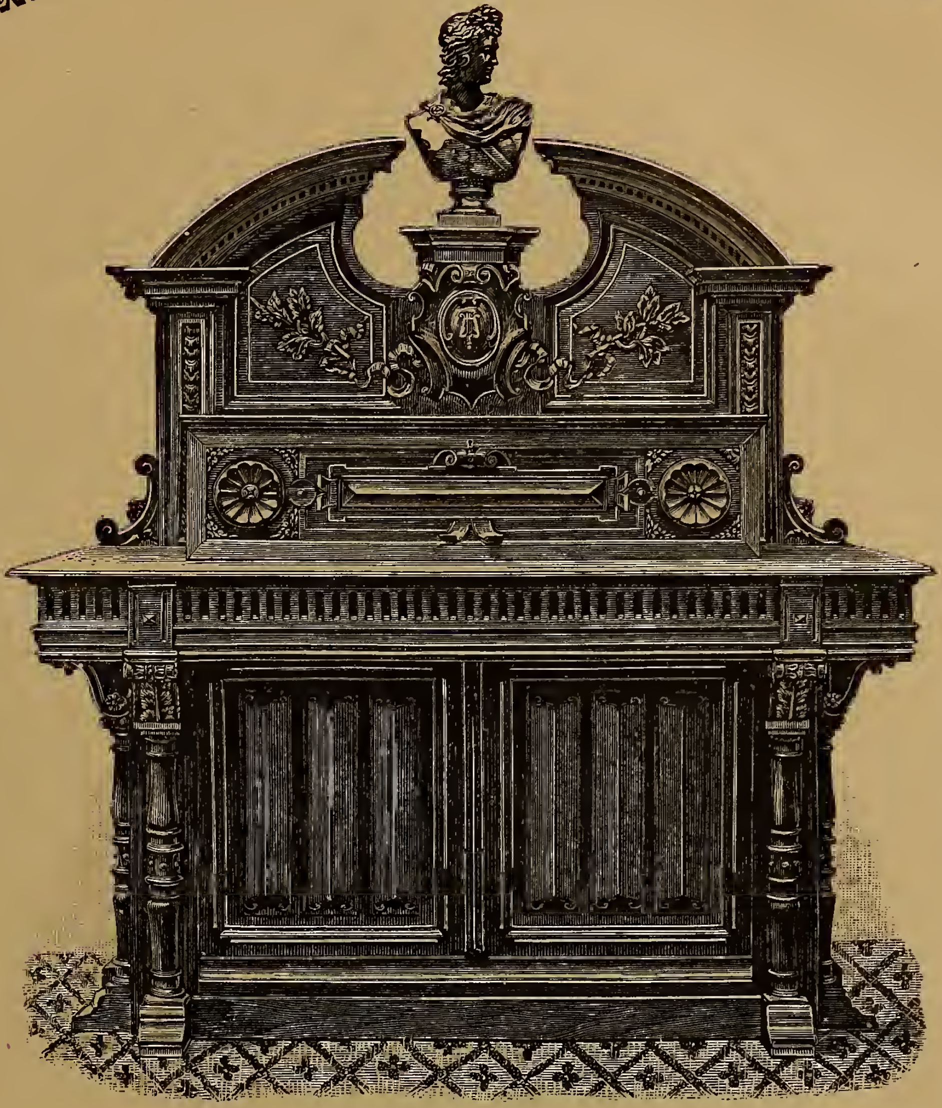
It is, however, in reference to imported articles that the common complaint of watchmakers in Germany and England is raised; but the remedy proposed is just the reverse of each other: in England we want uniformity outside the law, the Germans uniformity within the law, both agreeing that the "goose" ought to have no better sauce than the "gander."

On their side the organ already quoted says further "With the new regulation of things, as determined by this law, we have reasons, generally and on the whole, to be well satisfied, for it will make an end of the systematic and unfortunately only too profitable swindling, in relation to the quality of watch-cases, against which thus far we have fought in vain. It will not be long—and it will be the duty of watchmakers to enlighten the public on this matter—before it will be known in every section of society that reliance can only be placed on "stamped articles as to their quality of gold."

Notwithstanding this general horological chorus of "O this will be joyful!!!" there is a discordant sound from its very centre: it comes from no less a voice than that of Mr. Grossmann—What does it mean?

Supplement to The Watchmaker, Jeweller, and Silversmith.

MUSICAL : CABINET



MANUFACTURED BY

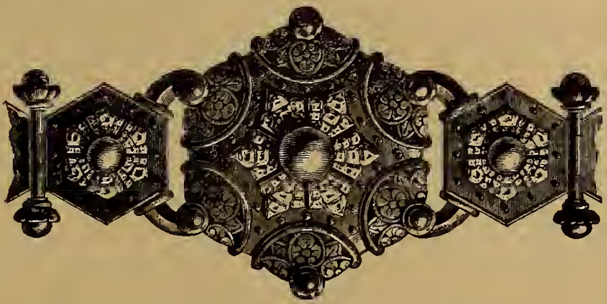
PAILLARD, VAUCHER & CO.,

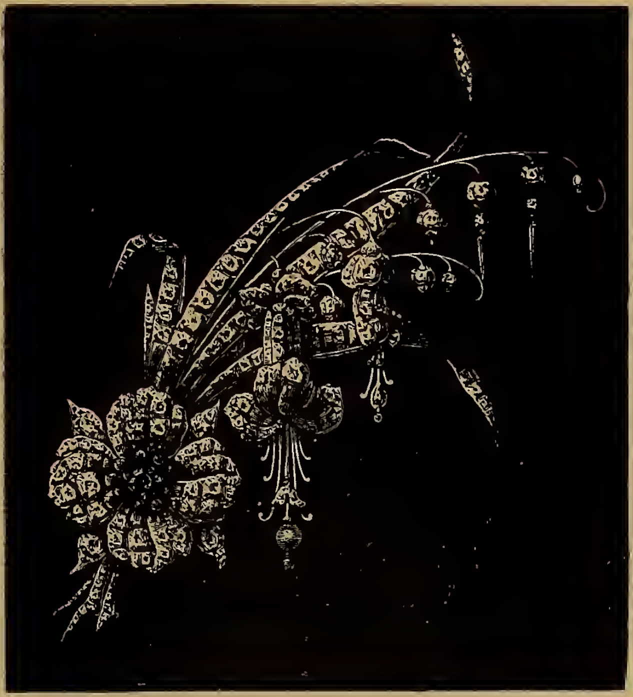
OF ST. CROIX, SWITZERLAND, AND 62, HOLBORN VIADUCT, LONDON.

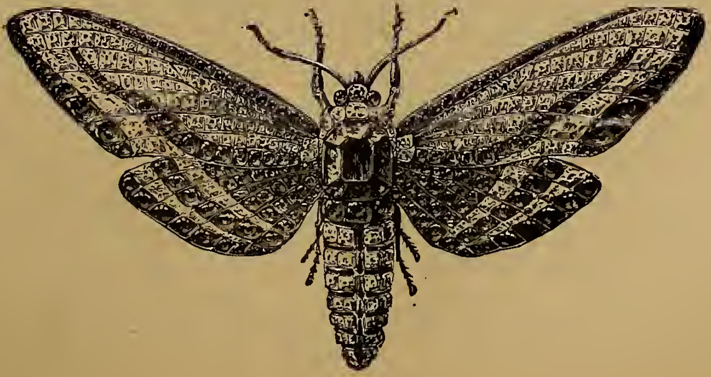
This Musical Box is manufactured on the Interchangeable System, contains 30 Barrels, playing 120 tunes. 500 pieces of Music can be had to select from. Designed by Mr. Henri Fivaz, Architect, of Paris. The Table is carved out of a solid slab of Oak. Underneath the Table is a Cabinet containing the Barrels.

Dimensions :—Height, 6-ft.; Length, 4-ft.; Width, 2-ft. 2-in.

MONTHLY SUPPLEMENT OF DESIGNS.







THE WATCHMAKER JEWELLER AND SILVERSMITH

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ILLUSTRATED SUPPLEMENT:—"Designs for Modern Jewellery."

Syllabus of School of Practical Watch and Clockmaking,

Under the Direction of Mr. I. Herrmann,

At Polytechnic Institute, 309, Regent St., W.

1. This School, consisting of day and evening classes, is founded for the object of providing a complete practical and theoretical tuition for youths who are intending to make watch and clockmaking their future occupation, as well as to afford an opportunity to those already engaged to improve themselves in any particular section of their trade.

2. The Syllabus of practical and theoretical subjects has been arranged with a view to meet the special requirements of watch and clockmakers, and that each student will receive the personal attention of the instructor.

3. Time of Study.—The full course will occupy from two to four years (depending in a great measure on the natural ability and perseverence of students); but when it is desired, the tuition will be conducted with the object of enabling a student to take a situation in a workshop in about two years, so that, where convenient, he can follow his further studies at the evening classes.

4. Method of Practice.—With a special view to the advantage of students distinction is made between that which is of primary importance, and what is expedient in general practical requirements. Thus pivoting is part of escapement-making, but so is constructing, planting, and adjusting; yet while the former is purely art, and requires much practice to approximate an average perfection, it is of far less importance and requirement than the latter, which is the application of principle, and called into use with every escapement that comes under the attention of the workman, hence will receive precedence in the course of instruction. This method will be adopted in order not to delay progress in primary on account of secondary objects, though provision is made for their tuition and practice.

5. Students attending to learn the trade have to join the day class for a period of not less than two years, and will be termed students of the school. Others, who are already in some way engaged in the trade, can attend part of the day class by special arrangement, or special evening classes, and will be termed class students.

6. Tools.—Notwithstanding the present demand for machinery for manufacturing, it is thought advisable to adopt the plan of educating personal skill and resources, rather than mere instruction in the use of expensive machine tools, which in after-life may (for pecuniary reasons) be beyond reach, as tending more to the interest of students, though instruction in the construction and manipulation of machine tools will be imparted as far as possible.

7. Requirements of Students.—All small tools to be found or made by the students as may be required for their particular work. This rule is adapted for the object of developing a habit of care and frugality among the students.

8. Large tools will be furnished by the school, and in peculiar circumstances small tools will be found as a loan or by special arrangement.

9. Relative Studies.—Students of the school will be required (without additional charge) to attend the following classes during their course of instruction:—Mathematics, Solid, Plane and Practical Geometry, Freehand Drawing, Theoretical and Applied Mechanics, Theoretical Watch and Clock Making (in connection with the City and Guilds of London Institute), Drawing for Watch and Clock Makers, and, if possible, the French and German languages. The above classes being held in the evening will not interfere with their practical instruction during the day.

10. Special Provisions.—Next to a knowledge of the conditions involved in the going of a clock or watch, those on which the uniformity of performance under the various external and internal influences depends is of the utmost importance. Nevertheless, great uncertainty and conflicting ideas exist in this matter. Therefore an experimental class is proposed, in connection with springing and turning, not only for the purpose of individual service, but for the deduction of further laws and principles in the interest of the trade at large.

11. Every endeavour will be made to form students into quick workmen; hence strictness will be exercised in relation to all matters interfering with this object.

12. Certificates.—Certificates of character, industry, progress, and efficiency will be given to students of the school. —Certificates of progress and efficiency only will be given to class students in the particular section in which they have attended.

13. Special Advantages.—The work of all students to be their own property. This system gives the strongest inducement to the students for the development of perseverance and industry, while at the same time they possess thereby the means of not only reducing the cost of tuition, but to gain a balance in their favour.

14. Where it is found that a student of the school does not possess the natural capacity or interest to ensure his success, he will be dismissed from the school.

SYLLABUS AND CLASS ARRANGEMENT.

Practical Classes

For Students of the School and others attending the Day and Evening Classes.

17. Time of Attendance.—The School will be open daily from 10 a.m. to 5 p.m. (Saturdays, 9 till 1), from June to September, and 10 a.m. to 10 p.m., from October to May.

18. Elementary Practice.—The instruction of students of the school will include—First stage: Pattern-making for castings of tools and parts of clocks—trimming and finishing castings—making tools and parts of tools for various purposes in connection with watch and clock making—clock plates, clock pillars and screws—clock barrel and barrel arbors—drums and fusees—parts of striking motion of clocks—clock wheels—watch plates—cocks of watches—watch barrels—gridiron and mercurial pendulums.

19. Progressive Practice. — Medium advanced: Completing measuring instruments — pivoting clock trains—making and planting—striking and chime motions—making recoil—dead beat and gravity escapements—perpetual calendars—completing watch barrels — making barrel arbors—pivoting great works of fusee watches—finishing Lancashire movements—making stud and index works—making sections of escapements.

20. Advanced: Pivoting—escapement making—horizontal escapement—lever escapement (table roller, double roller, cup roller, savages roller, resilient, clubtooth action)—chronometer escapement — keyless motions—repeating motions—perpetual calendars—chronograph, plain examining, jobbing, &c.

21. Timing and Experiments. — Springing — timing and adjusting—experimenting with regard to time of long and short pallets to a given clock—large and small pendulum arc, long and short pendulum—light and heavy pendulum—recoil—dead beat and gravity escapement—variable motive force — thermometric and barometric variation — long and short arcs of vibration of watch balances in relation to mean vertical and horizontal positions—large and small balances—light and heavy balances — large and small impulse arcs of balances—of pallets—light and hard locking resistance — flat and brequet springs — steel and palladium springs.

22. Class students and those attending the day class can select their work from the syllabus, or bring their own work, provided they have sufficient practice and experience to profit by the work selected.

Fees.

Students of the School (admitting to all classes of the School):—three months, £10 10s.; six months, £17 17s.; twelve months, £31 10s.; three years' course, £80; four years' course, £100.

The number of students in the school is limited. Intending students should therefore communicate at once with the Secretary.

Theoretical Classes.

Monday Evening, 8.30 to 10.—Preparatory for the City and Guilds of London Institute Examination in ordinary grade.

24. Syllabus: Great works of clocks and watches—conditions of their arrangement—mainsprings — stopworks—brace and maintaining work—form of teeth—of pinion leaves—proportions, uniform lead—calculations of trains—motions—conversions—properties and classifications of escapements—dead beat—recoil—horizontal—duplex—lever and chronometer escapements—conditions of pallets, length and weight of pendulum — pendulum, arc — elements of timing — elements of solar and sidereal observations. In this class the following prizes, in addition to a certificate, are offered by the City and Guilds of London Institute:—£3 and silver medal, £3 and bronze medal, £2 and bronze medal, £1 and bronze medal.

Tuesday Evening, 8.30 to 10.—Preparatory for the honours grade City and Guilds of London Institute Examination.

25. Syllabus: Analysis of escapements—horizontal—duplex — lever — chronometer—gravity, escapement — exercises,—equations to curves of teeth—depths—simple pendulum—compound pendulum — conical pendulum—compensation—timing — annular balance — isochronisms — timing and adjusting — temperature errors—Hartnup's formulæ. Solar and sidereal observations. In this class the following prizes are offered:—£5 and silver medal, and £5 and bronze medal.

26. Wednesday Evening, 8.30 to 9.15. — Preparatory class for students attending the ordinary class. Syllabus: Arithmetic — decimals — exercises—proportions, geometrical definitions — mechanical definitions — force — moment of a force—parallelogram of forces—friction—mechanical powers—unit of force—moving forces—falling bodies — capillary ction.

27. Wednesday Evening, 9.15 to 10.15.—Preparatory class for students attending the honours class (25).

28. Syllabus: Algebraic formulas and equations—practical trigonometry—use of tables of natural sines and cosines—logarithms—use of logarithmic tables—accelerated motion—motion in a straight line—motion in a circle—energy of a moving body—impact elasticity.

29. Drawing for Watch and Clock Makers.

Thursday Evening, 8 to 10.—Elementary exercises in plane and practical geometry—cycloid—epicycloid and hypocycloid—involute curve—epicycloidal and involute curved teeth—forms of pinion leaves—depths—plans of various escapements—calibres—striking—chime—repeating and keyless motions—plans and elevations—isometric projections—backlining and shading—colouring.

Evening Practical Classes.

On Mondays, 6 till 8 (Article 18); members 5s., non-members 12s. 6d. Tuesdays, 6 till 8 (Article 19); members 5s., non-members 12s. 6d. Wednesdays, 6 till 8 (Article 20); members 7s. 6d., non-members £1. Thursdays, from 6 till 7.30 (Article 21); members 8s., non-members £1. Fridays, 6 till 10, jobbing; members 12s. 6d., non-members £1 10s.

Theoretical Classes.

The Classes in connection with the City and Guilds of London, 4s. the session, subject to the conditions that students attend twenty evenings and present themselves for examination,

Lectures will be given occasionally on exceptional subjects.

Private instructions will be given by special appointment in any branch of the trade.

The opening lecture for the evening classes will be delivered on Friday, October 3rd, 1884, at 8.30, by Mr. I Herrmann.

The selection of Mr. I. Herrmann as teacher of these classes is certainly a happy and well deserved one; he is so well and so favourably known in connection with horological teaching that it is not necessary to enlarge on his merits. We may, however, appropriately give a list of his past successes:—

List of successes of Mr. I. Herrmann's classes, City and Guilds of London Examinations.—1881: Ordinary Grade—5 first, £2 and Bronze Medal; 2 second. 1882: Honours Grade—2 first, 2 second; ordinary—3 first and £2 and Bronze Medal; 2 second. 1883: Ordinary Grade—6 first, £3 and Silver Medal; 6 second. 1884: Honours Grade—£3 second; ordinary—4 first, £3 and Silver Medal; 3 second.

Obituary.

It is with the deepest regret that we have to announce the death of Mr. D. H. Hopkinson, for many years the sole proprietor and directing spirit of our esteemed contemporary, the *Jewellers' Circular*. He expired on Friday, July 25th, at his residence in Brooklyn, from typhoid fever, at the early age of forty-four. We never had the pleasure of making the personal acquaintance of Mr. Hopkinson, but judging from our correspondence and the able manner in which he conducted his journal, we feel sure that the American watch and jewellery trade has lost a valuable member.

A large turret clock has been erected on the school at Woodford, Northamptonshire, which strikes the hours, and shows the time on a large copper dial. The work was carried out by Messrs. John Smith & Sons, Midland Clock Works, Derby.

The Patents, Designs, and Trade Marks Act of 1883.

By C. Stuart Murray.

(*Continued from page* 19.)

SOME of the general features of the Act are useful to know. In the many conversations that arose during its passing, much was said about what would be done with the present Patent Office in Southampton Buildings, Chancery Lane; but that was provided for in this way:

Until a new Patent Office has been constructed according to designs more in consonance with modern requirements, the present place, mentioned above, shall be the legal Patent Office within the meaning of the Act; and it shall be under the care of the Comptroller-General, who shall, himself, be under the superintendence of the Board of Trade. The same officer may have a deputy to act for him whilst he is absent from his duties, so that the Patent Office shall be continuously open upon all ordinary days of business. The appointment and removal of all officers and clerks whatsoever, in the office, is vested in the Board of Trade, whilst the same authority, in conjunction with the Treasury, shall fix and pay all salaries and all expenses out of funds voted by Parliament. The Patent Office seal shall be entitled to judicial notice, and be admitted as evidence in Courts of Law. The Comptroller has power to refuse the grant of a patent for an invention, or to register a design or trade mark, of which the use would, in his opinion, be contrary to law or morality.

Where a person becomes entitled by assignment, transmission, or other operation of law, to a patent, or to the copywright in a registered design, or to a registered trade mark, the comptroller, shall on request, and on proof of title to his satisfaction, cause the name of such person to be entered as proprietor of the patent, copywright in the design or trade mark, in the register of patents, designs, or trade marks as the case may be. The person for the time being, entered in the register of patents, designs, or trade marks, as proprietor of a patent, and so on as just mentioned, shall, subject to any rights appearing from such register to be vested in any other person, have power absolutely, to assign, grant licenses as to, or otherwise deal with the same, and to give effectual receipts for any consideration for such assignment, license, or dealing, provided that equities in respect of such patent, design, or trade mark, may be enforced in like manner, as in respect of any other personal property. Every register kept under under this Act shall be open at all convenient times, to the inspection of the public, subject to such regulations as may be prescribed; and certified copies, sealed with the seal of the Patent Office, of any entry in any such register shall be given to any person requiring the same, upon payment of the required fee. Printed or written copies or extracts, purporting to be certified by the Comptroller, and sealed with the seal of the Patent Office, of or from patents, specifications, disclaimers, and other documents in the Patent Office, and of, or from registers and other books kept there, shall be admitted in evidence in all courts in Her Majesty's dominions, and in all proceedings, without further proof or production of the original.

The Court may, on the application of any person aggrieved by the omission, without sufficient cause, of the name of any person from any register kept under the Act, or by any entry made without the same cause, in any such register, may make an order either expunging or varying the entry, as the Court may think fit. And the Court may in any proceeding under this section, decide any question that it may be necessary or expedient to decide for the rectification of a register, and may direct an issue to be tried for the decision of any question of fact, and may award damages to the party aggrieved. Any order of the Court rectifying a register shall direct that due notice of the rectification be given to the Comptroller. That officer also may, upon request in writing accompanied by the prescribed fee (*a*), correct any error in, or in connection with an application for a patent, or for registration of a design, or trade mark; or (*b*) correct any clerical error in the name, style, or address, of the registered proprietor of a patent, design, or trade mark; (*c*) cancel the entry, or part of the entry, of a trade mark on the register: provided that the applicant accompanies his request by a statutory declaration made by himself, stating his name, address, and calling, and that he is the person whose name appears upon the register as the proprietor of the said trade mark. The registered proprietor of any registered trade mark may apply to the Court for leave to add to, or alter, such mark in any particular, not being an essential particular within the meaning of this Act, and the Court may refuse or grant leave on such terms as it may think fit. Notice of any intended application to the Court under this section shall be given to the Comptroller by the applicant; and the Comptroller shall be entitled to be heard on the application. If the Court grants leave, the Comptroller shall, on proof thereof, and on payment of the prescribed fee, cause the register to be altered in conformity with the order of leave. If any person makes or causes to be made a false entry in any register kept under this Act, or a writing falsely purporting to be a copy of an entry in any such register, or produces or tenders, or causes to be produced or tendered in evidence, any such writing, knowing the entry or writing to be false, he shall be guilty of a misdemeanor.

Where any discretionary power is by this Act given to the Comptroller, he shall not exercise that power adversely to the applicant for a patent, nor for amendment of a specification, nor for registration of a trade mark or design, without (if so required within the prescribed time by the applicant) giving the said applicant an opportunity of being heard personally or by his agent. The Comptroller may, in any case of doubt or difficulty arising in the administration of any of the provisions of this Act, apply to either of the law officers for directions in the matter. A certificate purporting to be under the comptroller's hand as to any entry, matter or thing which he is authorised by this Act, or any general rules made therunder, to make or do, shall be *prima facie* evidence of the entry having been made, and of the contents thereof, and of the matter or thing having been done or left undone. Any application, notice, or other document authorised or required to be left, made or given at the Patent Office, or to the Comptroller, or to any other person under this Act, may be sent by a prepaid letter through the post; and if so sent shall be deemed to have been left, made, or given respectively, at the time when the letter containing the same would be delivered in the ordinary course of post. In proving such service or sending, it shall be sufficient to prove that the letter was properly addressed, and put into the post. Whenever the last day fixed by this Act, or by any rule for the time being in force, for leaving any document, or paying any fee, at the Patent Office, shall fall on Christmas Day, Good Friday, or on a Saturday or Sunday, or any day observed as a holiday at the Bank of England, or any day observed as a day of public fast or thanksgiving, herein referred to as excluded days, it shall be lawful to leave such document, or to pay such fee on the day next following such excluded day or days, if two or more of them occur consecutively.

If any person is, by reason of infancy, lunacy, or other inability, incapable of making any declaration, or doing anything required or permitted by this Act, or by any rule made under the authority of this Act, then the guardian or committee (if any) of such incapable person, or if there be none, any person appointed by any Court or judge possessing jurisdiction in respect of the property of incapable persons, upon the petition of any person on behalf of such incapable person, or of any other person interested in the making such declaration, or doing such thing, may make such declaration, or a declaration as nearly corresponding thereto as circumstances permit, and do such thing in the name and on behalf of such incapable person; and all acts done by such substitute shall for the purposes of this Act, be as effectual as if done by the person for whom he is substituted.

An expression is used in this section of the Act, the "committee" of any incapable person, about which a word or two of explanation may be useful. The term "committee" has more than one meaning. We commonly understand it to be several persons to whom any matter or business is referred by any private or public body, for the purpose of being examined and reported upon to the body itself. Thus, both Houses of Parliament have committees of various kinds, so have corporations, railway companies, and any number of private individuals for any specific purpose. But, in the case of infants, lunatics, or other incapable persons, a committee is another thing altogether. It is not pronounced even in the same way, but as if spelt "commit-tee," whilst the general term committee is pronounced as if spelt "committy," the accent or stress being upon the "*t*," in the other word it is on the "*e*," The Lord Chancellor being in the case of lunatics, or idiots, the *committor*, whilst the person taking charge of the committed one is, as before stated, the *committee*. All three terms are from the root-word commit, in English, and the Latin word, *committo*, to send to, or upon, to give in trust, in the sense under notice; but the root-word has a number of other meanings besides, the most unpleasant one being that to which the magistrate applies it.

Copies of all specifications, drawings, and amendments left at the Patent Office after the commencement of this Act printed for and sealed with the seal of the Patent Office, shall be transmitted to the Edinburgh Museum of Science and Art, and to the Enrolments Office of the Chancery Division in Ireland, and to the Rolls Office in the Isle of Man, within twenty one days after the same shall respectively have been accepted or allowed at the Patent Office; and certified copies of or extracts from any such documents shall be given to any person requiring the same, upon payment of the prescribed fee; and any such copy or extract shall be admitted in evidence in all courts in Scotland, Ireland, and in the Isle of Man, without further proof or production of the originals. The Board of Trade may from time to time make such general rules, and do such things as they think expedient subject to the provisions of this Act, the things intended being:—

(*a*) For regulating the practice of registration under this Act.

(*b*) For classifying goods for the purposes of designs and trade marks.

(*c*) For making or requiring duplicates of specifications, amendments, drawings, and other documents.

(*d*) For securing and regulating the publishing and selling of copies, at such prices and in such manner as the Board of Trade thinks fit, of specifications, drawings, amendments, and other documents.

(*e*) For securing and regulating the making, printing, and selling of indexes to, and abridgements of specifications and other documents in the Patent Office; and providing for the inspection of indexes and abridgements and other documents.

(*f*) For regulating, (with the approval of the Treasury) the presentation of copies of Patent Office publications to patentees and to public authorities, bodies, and institutions at home and abroad.

(*g*) Generally for regulating the business of the Patent Office, and all things by this Act placed under the direction or control of the Comptroller, or of the Board of Trade.

Any of the forms in the First Schedule to the Act may be altered or amended by rules made by the Board of Trade; and general rules may be made under the section appertaining thereto at any time after the passing of the Act, and shall be (subject to the conditions hereafter mentioned) be of the same effect as if they were contained in the Act itself, and shall be judicially noticed. Any rules so made shall be laid before both Houses of Parliament, if Parliament be in session at the time that such rules are made, or, if not, then as soon as practicable after the beginning of the ensuing session, and shall be advertised twice in the official journal to be issued by the Comptroller. If either House of Parliament, within the next forty days after any rules have been laid before it, resolve that any of them shall be annulled, such annulment shall take effect after the date of such resolution; but without prejudice as against anything that may have been done under them in the meantime. Before the first day of June in every year, the Comptroller shall cause a report of the particulars of the working of the Act, to be laid before both Houses of Parliament; and such report is to include all the general rules made for that year, and an account of all fees, salaries and allowances, and other money received and paid under the new Act.

"International and Colonial Arrangements" are as follows: If Her Majesty is pleased to make any arrangement with the Government or Governments of any foreign State, or States for the mutual protection of inventions, designs, and trade marks, or any of them, then any person who has applied for protection for any invention, etc., in any such State, shall be entitled to a patent for it, or for the registration of his design or trade mark (as the case may be) under this Act, in priority to other applicants; and such patent or registration shall have the same effect and date as the date of the protection obtained in such foreign State. Provided that the application is made, in the case of a patent within seven months, and in the case of a design or trade mark within four months, from the application for protection in the foreign State with which the arrangement is in force. It is a condition that nothing in the section giving these facilities shall entitle the patentee or proprietor of the design or trade mark to recover damages for infringements happening prior to the date of the actual acceptance of his complete specification, or the actual registration of his design or trade mark in this country, as the case may be. The publication in the United Kingdom, or the Isle of Man, during the respective periods just mentioned, of any description of the invention, or the use therein, or the exhibition or use therein during the periods, of the design, or the publication thereof of a design, or trade mark shall not invalidate the patent which may be granted for the invention, or the registration of the design or of the trade mark. The application for the grant of a patent, or the registration of a trade mark for international and colonial purposes, such as have been here set forth, must be made in the same manner as an ordinary application for this country alone; provided that, in the case of trade marks, any such mark the registration of which has been applied for in the "country of origin" may be registered here under the Act. The provisions are to apply only in the case of those foreign States with respect to which Her Majesty shall from time to time by Order in Council declare to be applicable, and in force with respect to that State. This condition of the new law will give to foreign inventors in Great Britain, and British inventors in the agreed countries a legal status which they never had before, and will get rid of a great deal of disappointment and bitterness with respect to inventions upon both sides that are pirated as soon as they can be laid hold of.

In our next number we shall be able to finish these very instructive features of the Patent Law, and probably give an exact transcript of the new form of patent itself.

(*To be concluded in our next.*)

The Spectacle Trade.

Herbert *v.* Furness.

On July 17th, in the Clerkenwell County Court, before Mr. Justice Eddis, Messrs. Herbert & Godfrey sued Mr. J. M. Furness, of 137, Fitzwilliam Street, and 51, Milton Street, Sheffield, for £9 12s., the value of certain spectacles alleged to have been ordered by and delivered to defendant. Mr. Myers appeared for the plaintiffs, and defendant was represented by Mr. Haigh, instructed by Messrs. Nash and Field.

The plaintiffs had no witnesses, but called the defendant. According to his evidence the plaintiffs' eloquent traveller called on him in July, 1883, and persuaded him to take up the spectacle trade, saying that he would make £200 a year by it. Defendant ordered spectacles to the value of £9 12s., signed an order on a printed form, and was given a copy of it. He found they did not sell, but paid for them at the time agreed. In October the traveller called again, but the only order given was a verbal one for a few pairs of pebble spectacles as samples, about 15s. worth; in any case less than £1 worth. They were to be sent promptly. There was great delay, and defendant wrote countermanding order on that account. Plaintiffs wrote that they would not accept the countermand, and would send the goods off. The invoice sent was for goods to the amount of £9 12s. Defendant wrote at once saying he was surprised at the way his order had been magnified. When brought to his shop by the railway company at the end of November he refused to accept delivery. The plaintiffs then wrote a threatening letter, saying that the goods were lying at the railway office at defendant's risk, and when they were again brought to the shop they were taken in by the porter in defendant's absence. As he had ordered 15s. worth, he took them in, and wrote saying that they were lying in his shop, and asking what he was to do with them. Since then the traveller called again, and defendant was asked to try and sell them to some of his neighbours. This he did, but failed. Plaintiff's solicitor admitted there was no signed order, but relied on passages in the subsequent correspondence as admitting the claim.

Judgment was given for the defendant on the ground that it was admitted that there was no signed order; that when he did take in the goods he was justified in doing so, because he had ordered 15s. worth and also wrote stating that he had not ordered them and would not accept them.

The judgment for the defendant was with costs, but not on the higher scale, as the 15s. for which liability was admitted had not been paid into Court.

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School of Practical Watch and Clock Making.—The Polytechnic, 309, Regent Street. Commencing October 6th.—The above School guarantees advantages which, under the best conditions of the apprenticeship system, cannot be obtained. Every item of practical importance is included in the Syllabus. Students have personal and exclusive attention of a teacher of exceptional experience in the Practice, Theory, and Tuition; and the method that will be employed ensures them the full benefit of their work and their efforts. For prospectus, and all further particulars, apply, with stamped envelope, to the Secretary, Mr. R. Mitchell.

The "Hall-Marking Question" in Germany.

(*Continued from page* 32.)

"I WOULD especially entreat my colleagues," so writes Mr. M. Grossmann in the *Deutsche Uhrmacher Zeitung,* "well to consider the expenses, clippings, and losses attending the introduction of a compulsory stamping. It is fortunate that we have been exempt from a legal control of the fine alloy of gold and silver articles. We need but see how in Austria, France, etc., the watchmakers fare: no imported watch is allowed to pass into their hands until it has been overhauled by a stamping official (who is, however, only to be met with in larger towns), regardless of any legal foreign stamp with which it may be already impressed.

"Readers of English trade journals well know of the frequent and bitter complaints that are raised against the spoiling of good cases through clumsy and rough punching at the Goldsmiths' Hall. Moreover, it is to be remembered that English cases are stamped in an unfinished state, and are, besides, much stronger than most cases with which we have to do.

"It is, therefore, easy to foresee, what must be the fate of cases which are finished and much lighter, if their various sections, as bow, pendant, middle, back, bezel, etc., are afresh subjected to the punching process. Such a law will be for the German watchmaker, whose sale trade lies chiefly in imported watches, a misfortune, and it will therefore be to his interest energetically to oppose this threatened calamity."

This reminds one of the Israelites of old, dancing around their golden calf, when Moses appears on the scene and spoils their little game. Evidently Mr. Grossmann advises his horological brotherhood to sit quietly in the pan, lest they should jump over the rim into the fire. The advice may be well meant, but it is rather stoical.

It is not difficult to predict, what will happen to the man who gets into deep water if he cannot swim; nor is it very kind to warn him of it, if it is only a question on which side of the bridge he likes to be pushed in; but it would be something to show him how to avoid the water, or how to float.

We need not go to Germany to learn that they only wear the shoes that pinch. But a few days back we saw a gold Geneva hunter marked 18 carat, that really was not up to 9, if it was as good as 7 carat. Still it was sold as a gold watch, and the thief that sold it can snap his fingers at the law. It is for such cases as these that the German watchmakers are endeavouring to make provision, by the assistance of the law; and if watchmakers everywhere do not agree with them as to the mode, they all must sympathise with their object. It certainly appears strange, that the Goldsmiths' Hall should be so exceedingly jealous of the honour of 18-carat in one kind of watch-case, while it does not seem to care a button about fifty times that number of another kind. Does sin become virtue when multiplied?

The arguments that we have heard in favour of abolishing Hall-marking seem advanced less with the object of suppressing dishonest transactions, than of removing restrictions on British manufacturing. But, after all, the virtual restriction is the relative conditions between the man who sells an article for what it really is and him who represents it for what it is not. It is not a question of degree, and therefore lowering the degree will not remove the evil. The honest dealer cannot, and will not sell a watch for 18 carat, if it is only 17 carat; and therefore to him the abolishing of the Hall-mark makes no real change, nor would this change stop the fraudulent dealing in pseudo-gold cases.

The question is therefore identical with that raised in Germany. It is true Mr. Grossmann is a witness for the prosecution of the Hall-mark, but his argument is as weak as London milk. His objections are based on the supposition that the officials will habitually neglect their duty, or rather exceed their duty, by doing that which the law does not require them to do; for cases with a legal stamp are not required to be re-stamped, and evidently, according to the prophecy of Mr. Grossmann, there will be little difficulty to detect that unfortunate official who should sin on this point. Therefore the argument against genuine cases vanishes. As regards any others, it is evident that it is quite in harmony with the object of the petitioners if the stamper converts all others into stencil plates, nor do we think many watchmakers worthy of the name would go into mourning if a similar event would take place with such cases here. The further point, that watchmakers would suffer by delay, is altogether besides the question. Surely no watchmaker would be so unwatchmaker-like to buy watches unstamped, and then send them away for that process. It is therefore a question for the importer. If he has to submit his cases to stamping, he will be only too anxious not to delay that little business till he crosses the frontier, with the chance of having his cases knocked into the shape of an old umbrella. Thus, by increasing the risk, the balance in favour of fraud will become smaller; hence, after all, the German watchmakers appear to have thrown out the right net, and we shall anxiously look for the result.

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Correspondence Column.

WEIGHTS AND MEASURES ACT.

TO THE EDITOR OF THE "WATCHMAKER, JEWELLER, AND SILVERSMITH."

Sir,—Since Mr. Robert Pringle replies, in the August issue of your esteemed organ, to my communication in the July number concerning the "Weights and Measures Act" signing his name in full, it would be unfair for me to remain behind the screen of the initial signature, "H.B." Mr. Pringle appears to make out that I am satisfied or even gratified at the action of the authorities in the matter, which I am really at a loss to comprehend, as the late prosecutions cannot possibly afford any gratification to any one engaged in the trade, and I have not given the slightest hint in my previous communication which might be construed to a pleasant feeling, or, as Mr. Pringle calls it, "to rejoice in seeing others *made mutton of*, in order to nourish the rest." The expressed words by Mr. Pringle lead me to believe that he has mistaken me for a party to the inspector, who pocketed by the prosecution half of the imposed fines. Mr. Pringle appears to presume that I assumed his pleading of ignorance of the Act; for which I have not given the least cause in my communication, but have kept strictly within the expressions of the judicial report of the defence set up in several cases, that the weights complained of were not used for buying and selling, but merely for weighing out to the workmen, which I in my communication certainly called a lame and inadmissible excuse, for which I cannot find any retraction, as the prosecution against the parties for using the old Troy Weight instead of the Decimal Weight, in accordance with the Act passed more than five years ago, fully established that the prosecuted parties adhered to the old and illegal system, instead of adopting the new and legal one: the latter I still consider to have been their duty to adopt, not merely to conform with the Act, but to accustom their employés to the use of the legal weights for precious metals, as ordained by the Act of Parliament.

Respectfully yours,

Hessle Road, Hull. Herman Bush.

Musical Boxes.

A Glance at their Manufacture at St. Croix, Switzerland.

(*Continued from page* 22.)

> "Soft is the music that would charm for ever;
> The flower of sweetest smell is shy and lowly."
> Wordsworth.

I NOW sit down to write a third and concluding paper on this important subject. If I was within speaking distance of my readers, I should trouble you with some such questions as these,—What special process is there carried on in Messrs. Paillard's factory that you would like me to describe? Would you like to know how a comb is made? Or shall I describe minutely the process of piercing the barrel, and of placing in it with the greatest possible precision, an almost infinite number of small steel pins? Or would you like to know how to keep a musical box in good order; or how to clean and repair one when it is broken and dirty? Or shall I explain the different processes of manufacture that must be adopted in making instruments that differ widely in value?—*e g.*, in this factory a small musical box is made by thousands, that is sold retail for 2s. 6d.; and some are made that realize £800, and are worth every shilling. The study of processes, which produce such widely different results, is both interesting and instructive. I hope an opportunity will be given me to answer all these questions, and as many more as you may like to ask.

On leaving the factory and going into the counting-house, I had an opportunity of seeing the cost of producing the goods at St. Croix, and the prices charged for them at Holborn Viaduct. The small margin of profit is, I think, to some extent due to our English free trade notions; but of this I am quite certain, that the men who are going to trade successfully in this class of goods in the future must possess an intelligent view of all these questions, or they will find that their customers can explain these matters more perfectly than the information they get from second and third-rate commercial travellers. If trade journals would make it their business to supply reliable information of this kind, in lieu of miserable trade puffs, then they would indeed confer a great boon upon the trading communities they represent.

One of the peculiar features of our times that will yet work marvellous results, is the disposition on the part of manufacturers to show visitors over their workshops: this remark applies even to conservative Switzerland. Indeed, so common is this practice that the refusal to comply with a polite request of this kind amounts to a tacit acknowledgment on the part of the manufacturer that he possesses nothing worthy of notice. If I had space I could give you some amusing experiences that would illustrate the practice of bygone days. I cannot omit one. In the year 1852, a youth, who had learned the elements of watch and clockmaking in a northern county, came to London to perfect himself in the art, and, having a great desire to see how a wheel was divided and cut, he one day knocked at the door of a house in Clerkenwell, and, after carefully observing the formalities, requested the proprietor to explain the process of wheel-cutting; he would also like to know how the cutters were made and sharpened. The wheel-cutter was indignant, and ordered him off the premises, telling him, with much emphasis, that these things were kept secret. At this the youth was cast down, but not killed; the rebuff only increased the desire, and in renewing his attempt to gratify it he determined to try by stealth, and took the precaution to take two young ducks in his hand; and in much fear he knocked at the door of a Mr. Nathaniel Cox, of Goswell Street, and after presenting the birds, asked if he would show the process of wheel-cutting. Nat—for he was best known by his familiar name—was soon turned into a duck, and in complying with the request, showed much caution and suspicion. In visiting this factory, it will not be necessary to take two young ducks in order to obtain a passport; a polite request is all that is necessary. Doubtless the young men, who are studying the art and science of watchmaking at the technical schools at the Horological Institute, will recognise the great advantages they possess in this matter of wheel-cutting.

In making a key-board, or comb, as it is sometimes called, no expense is spared by the proprietor in procuring the very best metal that can be obtained, and which experience has proved to be most suited for the purpose. It is that which is known as mild cast steel, or spring steel. It is not so highly carbonised as that which is used for gravers and cutters. The workman no sooner takes the rough piece of metal in hand than he commences to examine it most carefully, to see if there is any flaw or imperfection in it. The tests applied are such as these: First the tensile strength is examined: if it shows a tendency to elongate and then return, as it were elastic, it is a good sign; a small piece of the metal is then broken off; if it shows signs of toughness and has to be bent backwards and forwards several times before it gives way, this is also a good sign, but if it should break easily it is at once rejected. The broken surfaces are then examined microscopically, and flaws in the metal, if any, are then easily detected. If on the broken surfaces large bright crystals appear, after showing but little strength in breaking, the metal is undoubtedly bad. The sound of the metal, and continuation of the note, is also a test. The workmen possess great skill in these preliminary operations. The pieces of metal are cut from the large sheets by shears, and always so cut that the teeth of the comb can be cut in the direction of the grain, *i.e.*, the direction in which the metal is rolled. It is then planished and annealed, being made red hot—a dark red, not white heat—and covered up in plenty of sawdust, so that no air can get to it, and allowed to cool gradually. The teeth are cut with great rapidity and exactness in an elaborate dividing-engine worked by steam power. In the tuning of the key-board it is sometimes found, notwithstanding the care in the commencement, that one or two of the keys will show feebleness, and want power and volume of utterance: these keys are taken out and new ones replaced by the following process. A key is made the same shape and temper as the defective one, but on the under part a foot is formed. A slot is then filed out of the steel block of the key-board the exact size of the foot. The new key is then gently hammered into its place, care being taken in this operation to fix it in a line with the other keys. It is then soldered in its place with the ordinary soft solder and soldering spirits used by tinmen. In this operation it is necessary to use a very large soldering copper bit, weighing about seven or eight pounds: a smaller one will not retain sufficient heat to penetrate the key-board. When the key is well fixed, it is filed up perfectly level with the others, and tuned by filing it underneath. If it has been executed by a good workman no one can detect it. A premium is put upon workmen who show great cleverness in this kind of work, as they are generally drafted away to the London or New York depôts for repairs, an extensive business of this kind being carried on at each of these houses in difficult repairs that the proprietors would be glad to get rid of, and they contemplate publishing an exhaustive treatise on this subject for the use of their customers.

P.S.—Just at the moment of sending the above to the press, I was agreeably surprised to receive from the proprietors a polite invitation to revisit their factory. It appears that, during the past twelve months, they have been making special preparations for the Christmas markets. It is quite possible that I shall collect some information that will lead to a future paper.

Dijon *en route*, August 20, 1884.

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Cost of Foreign and Colonial Patents.

Argentine Confederation.—Five years, £70; ten years, £92; fifteen years, £125; trade marks, £20.

Austria and Hungary.—One year, £18; two years, £21; three years, £23; five years, £28; eight years, £41; eleven years, £61; thirteen years, £80; fifteen years, £100. Patents for short periods may be prolonged on payment of difference, and a fee of £4.

Belgium.—£9; patent of addition, £8. Annual tax, twenty francs before end of first year, thirty francs before end of second year, and so on, increasing ten francs yearly. Duration of patent, twenty years.

Brazil.—£35. Duration, twenty years.

Canada.—Five years, £18; ten years, £23; fifteen years, £28. Renewal, five to ten, or ten to fifteen years, £7; five to fifteen years, £12.

Cape of Good Hope.—£35; at the end of three years, £10; at the end of seven years, £20. Duration fourteen years.

Ceylon.—£30. Duration, fourteen years.

Chili.—£50 to £80. Duration, ten years.

Denmark.—£13. Duration, three to five years.

Ecuador.—£44; add £2 for every year of the term for which the patent is required, from five to twenty years.

Finland.—£45. Duration, twelve years.

France.—£12. Annual tax, £5. Duration, fifteen years.

Germany.—£15. Annual tax, £3 10s., increasing £2 15s. yearly. Duration, fifteen years.

Guatemala.—£52. Duration indefinite.

Guiana (British).—£55. Before end of seventh year, £22. Duration, fourteen years.

Greece.—£50. Duration indefinite. A special Act of Legislature required for each patent.

Holland.—No protection.

India (British).—£30. Duration, fourteen years.

Italy.—One year, £15; six years, £18; fifteen years, £24. Annual tax, £2 10s. first year, to £7 10s. last year.

Japan.—No protection.

Liberia.—£32. Duration, fifteen years.

Luxembourg.—As Belgium.

Mauritius.—£30. Duration, fourteen years.

Mexico.—Cost uncertain. Duration, ten years.

Natal.—£27. Before end of three years, £8; before end of seven years, £13. Duration, fourteen years.

New South Wales.—£40. Duration, seven or fourteen years.

New Zealand.—£33. Duration ends with original patent.

Norway.—£13. Duration, ten years or under.

Paraguay.—Cost uncertain.

Peru.—Law inoperative,

Portugal.—£35. Exceptional regulations for chemical patents. Duration, fifteen years.

Queensland.—As New South Wales.

Russia.—3 years, £32; 5 years, £40; 10 years, £84.

South Australia.—£30; before end of three years, £9; before end of seven years, £9. Duration, fourteen years.

Spain and Colonies.—Three kinds of patents are granted. (*a*) Unpublished inventions. Duration, twenty years. (*b*) Patented abroad within two years but not publicly worked in Spain. Duration, ten years. (*c*) Inventions known but not worked in Spain granted to first manufacturer. Duration, five years. Cost of patent from £16 to £20. Annual progressive fee £2 8s. first year, increasing 12s. yearly.

Straits Settlements.—£35. The proprietor of a British patent may have it registered so as to be operative in the Settlements for £28.

Sweden.—£18. Fee varies with length of specification. Duration fixed by Chamber of Commerce, but not to exceed fifteen years.

Switzerland.—No protection.

Tasmania.—£33. Third and seventh years same as Victoria. Duration, fourteen years.

Turkey.—£35. Annual tax, £5.

United States.—Patents, £21; designs, three and a half years, £10; seven years, £12; fourteen years, £15. Duration of patent, seventeen years.

Venezuela.—£35.

Victoria.—£30. Before end of third year, £15; before end of seventh year, £20.

West Australia.—£70. Duration, fourteen years. The owner of a British patent may have it registered for £45, when it becomes operative in the Colony.

West Indies (British), including Jamaica, Windward Islands, Trinidad, British Honduras, the Bahamas, and the Bermudas. Cost of patent in each Colony from £12 to £25.

The duration of the patents granted in many countries is limited when the inventor has obtained patents in other countries. In some cases it is determined by the expiry of the term of the original patent, in others by the expiry of the foreign patent first becoming void. The fees quoted are only approximate, and do not generally include the cost of drawings. It has merely been intended to convey an idea of the average cost, including translations, agency fees, etc.

The fees in every case are payable in advance.

Personal attendance is unnecessary, as on receipt of full particulars the requisite forms for signature can be forwarded and returned by post.

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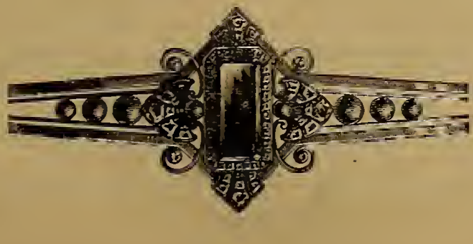
Crocidolite.

GENERALLY pronounced *krō-sid'-ol-īt*, sometimes, though rarely, called *crō-kid-o-lite*, [Greek *krokis*, *krokidos*, nap on cloth, and *lithos*, a stone.] A mineral consisting principally of silicate of iron, occurring in asbestos-like fibres of bright silken appearance.

It is brought to this country in large quantities from Griqualand, South Africa. It is there called the Orange River cat's eye.

In Germany it is called tigeraugen or tiger's eye. It is also called the sun stone, because it looks like the waving rays of the sun. Under certain aspects it appears like molten gold. Doubtless, in its primeval formation it was exposed to the burning rays of the sun, which has left its mark of light and beauty in the stone. But its chief attraction is its chameleon-like appearance. It is really a cat's eye, and some of the best specimens will rival the finest Oriental stones. It has a peculiar rich silken appearance. In addition to the golden shade there are specimens of light and dark green colour, also of dark red, and crimson, and chocolate colours. The stone is very hard; it has to be cut with diamond powder, and takes a high polish. I cannot state the exact time it was first brought to this country, but about four years ago a few fine specimens were sold in the London precious stone market, Hatton Garden, at very high prices; this attracted the attention of South African merchants, who are now sending over large quantities, but while many tons of the rough stone arrive here, yet fine specimens are comparatively rare. It is more opaque than the Oriental cat's eye, and also possesses the rare quality of being a good night stone—unlike the sapphire, which is full of lustre and bright with heavenly blue when the morning sun shines upon it, but looks like an inky cloud when the sun goes down—for when the gas is lit crocidolite is seen to the best advantage. It has a dark and cloudy appearance which, perhaps, slightly militates against its beauty. It is doubtful if it will realise the high position in gem-work that was first predicted for it. Its first advent in the London market was at a time when dealers and wearers of jewellery were wearied with the surpassing brightness of the diamond, and both seemed glad to relieve their eyes by looking upon something less bright and yet beautiful. In point of fact it is a "new thing," which has a great trade, and therefore a great future before it; but we must find for it the most fit and proper places. By far the largest stock of rough, cut, polished, mounted and unmounted crocidolite in London is that of Harris, Lehmann and Co., 48, Hatton Garden. It may be useful to the wholesale and retail traders to mention some of the uses to which it has been applied. In gentlemen's jewellery I examined an immense variety of pins, such as horseshoes, cameos, and beads, also studs, solitaires, seals, charms, vest and coat buttons, dog whistles, stick and umbrella mounts. In ladies jewellery an immense variety of brooches and earrings. I may mention that it is especially suited for making the body or trunk of insects, some specimens of this kind, mounted in gold and silver and profusely inlaid with diamonds and rubies, produce a charming, almost life-like effect. It answers well for necklets, beads, hair-pins, vinaigrettes, charms, card and needle cases, crochet hooks, and jewellery caskets. In cutlery it makes splendid handles for dessert knives, also for pocket knives, pickle-fork handles, letter weights, candlesticks, pedestals. It is used for pencilcases, crosses, inlaying for marble clocks, cabinets, mantlepieces, altars, pianofortes, chess, and occasional tables. In some aspects the stone resembles the rich grains of walnut and mahogany, and for this reason often finds its way into art furniture.

In concluding this notice of crocidolite, the writer would like to suggest that it seems most desirable that a reliable monthly statement of the state of the London precious stone market should appear in the pages of this journal. We have only to mention the fact that every year diamonds over £5,000,000 in value arrive in Hatton Garden from the Cape. Information of this kind is eminently calculated to develop the trade, and secure safe and profitable investment. Perhaps the reader will favour us with his views upon the subject.



Engraving.

(*From the "American Horological Journal."*)

Continued from page 20.)

Engraving on Jewellery and Plate.

FOR lettering upon jewellery and plate it is necessary to have thirty or forty gravers, several being required similar in shape to those used by engravers on wood or steel. These tools are straight on the bottom, the width making the different degrees of fineness; but for gold and silver ware that is hollowed the straight tool cannot be used; it is necessary that the points of the gravers turn upwards. In several tools the points may be turned up sufficiently by grinding the tool on an oil-stone; but in others the tool is bent upwards, as much as required, before it is hardened, the face being made as in other gravers. By "face" we mean the end of the tool that is ground on the oil-stone to sharpen it. An oil-stone for sharpening tools is of course essential, and must be of fine quality; and sweet oil is the best for using on it.

A stand, with an arm to hold a magnifying glass, is required; the arm having a joint in it, with a screw which permits the glass to be placed on any required plane. Pads or cushions of several sizes are required, some being little more than two inches across, and are used singly or together, one on top of another. They are also stuffed to different degrees of hardness, some being so soft that the article to be engraved may be indented into it.

To hold the various articles in place, several small adjuncts are necessary. For holding knives, spoons, etc., small clamps are required; these are made of wood, and are about two inches in diameter, one diameter, however, being greater than the other, the shape of the top being a flattened circle. This clamp is divided in halves, slightly hollowed inside, and joined together by a hinge at the bottom. At the opening on the top the wood is grooved to make a rest for the fork, spoon, or other article to which it may be applied. The top, with its groove, is capped with brass; and narrow slips of leather or metal are laid into the groove, according to the thickness of the plate placed in it, it being essential that the surface to be engraved shall be level with the top of the clamp.

Half way from the bottom to the top a screw permits the top to be opened to the proper width for the article to be placed in the rest, and holding it firmly while being engraved. When rings are engraved on the outside, they are slipped on smooth sticks, which are tapered to fit different sizes of rings. To engrave inside, the engraver holds the ring in his fingers, resting it on the cushion. Napkin rings, pencils, heads of canes, card-cases, etc., are also held by the fingers. To hold a thin plate of metal in place, blocks of wood are used, small tacks at the edges of the plate keeping it in place. A steel burnisher is required by the silver engraver; also a set of mathematical drawing tools and bones, covered with buff leather, to remove the finger-marks from the surface of the metal.

To prepare an article for engraving, the engraver dims the surface with candle-grease, which he applies with his fingers, a very slight quantity being sufficient.

To rule straight lines on a flat surface, a small thin steel rule is used. This is rectangular in shape, with rectangular opening, leaving on one side and the ends a third of an inch of metal; on the other side two-thirds of an inch is left. To rule lines on a circular surface, as, for instance, a cup or round napkin ring, a pencil-holder is fastened at right angles to a short rod of steel, which the engraver holds between his fingers at the edge of the article, and, turning it carefully, makes his lines parallel with the top. We have seen a rod which was adjusted with a flexible point and screw, which enabled the engraver to set his pencil at whatever angle he might require for the article on which he was at work. This is especially serviceable for the inside of silver ware, such as a cake-basket. The "pencil" used is made of boxwood, pointed; and although its point will trace lines on the dimmed surface, it will not scratch the metal. Formerly steel points were used; and where the lines traced were guide lines, it was necessary, after the lettering was done, to remove them with the burnisher. The boxwood point, it may be seen, is a great improvement.

The engraver also uses these boxwood pencils to sketch out the letters he desires to engrave; then, according to the shape of the article, he selects a suitable graver for the lettering. When requisite that a set of spoons, knives, etc., shall be marked alike, one article is engraved with the letters selected; after which the surface is spread with a coat of candle-grease, which is carefully filled into the lettering, and the superfluous grease is removed from the face of the article, leaving the letters filled. A piece of dampened woven letter-paper is then laid over the lettering, and with a burnisher an impression in grease is printed on the paper. This impression is now ready to trace upon the gold or silver as many copies as are required. At first a slight pressure with the fingers is sufficient to make a trace upon the surface of the metal; afterwards the burnisher is required. One of these impressions will usually trace two dozen articles. The proper gravers are selected, and the letters cut in this tracing, the hair lines and the broad lines being cut at different degrees of depth. It is usual to prepare, in the copy from which the tracing is made, only the body of the letter, the ornamental dots and points being added to each duplicate by the engraver, eye-practice giving him precision in this respect. After the article is engraved, it is wiped clean with chamois skin, no trace of the grease remaining.

Shades and screens for the protection of the eyes are adjusted according to the exigencies of the place in which the engraver is obliged to work, it being generally conceded that a north exposure gives a clearer steadier, light than any other; but shades may be adjusted so that any exposure may be used. The rule should be, to have sufficient light on the work to see well, but a glare should be avoided. It is important that the light fall on the work, and the eyes be shaded. Attention in this respect will enable the engraver to see better, and not wear out his eyes.

In ornamental engraving many of the tools used are similar to those used by letter-engravers on steel or flat silver surfaces; technically, by the ornamental engraver they are called "line-gravers." But, to perform most of the ornamental engraving, tools are required with fine lines cut into the bottom of the tool; and when held steadily on the plate a series of fine lines are cut, known as shading. Some of these tools make only two lines, and others make three, four, five, or six; they are generally straight on the bottom, and, in engraving, the hand is held high, so that the point of the tool touches the plate, the left hand moving it as the design requires. At present the ornamentation in vogue is called "bright work," and is produced by holding the tool as aforesaid, and wriggling it in short rapid turns, the left hand turning the article. When this wriggling is done rapidly, the wave-effect produced on the lines cut is almost imperceptible to the naked eye. The lines made by this method are so delicate that the light falls on them in such a manner that it makes the design look white on the tinted background of gold or silver; and a large variety of ornamental leaves scrolls, etc., may be executed with these tools.

For figures, animals, scrolls in outline, etc., the line-gravers are best adapted. Many designs employ the several kinds of tools, which are sharpened on an oil stone, the same as other gravers; but for "bright work" it is necessary that they be polished upon a block of wood covered with rouge and oil, which imparts a polish to the tool that enables the engraver to cut his work with great brilliancy and beauty of effect. The ornamental engraver preserves proofs of his work on paper, the same as steel-plate engravers, which are used to trace the design again when required. An original design is drawn on paper, which is perforated with a fine needle and laid upon the article to be engraved; pumice stone is then beat upon the paper, the design being traced on the plate in fine dots.

To preserve a *fac-simile* of the engraving on a flat surface, printer's ink is rubbed into the lines, the surface being wiped clean, in the same manner that a steel plate is prepared for printing. But a silver salver or cake-basket cannot be made to pass through a printing-press; so to get an impression from them, some plaster of paris is wet with water to the consistency of batter and poured over the whole article. It is allowed to become set and dry, and, being then removed from the silver ware, a perfect representation in black of the design is printed on a white surface.

This department of ornamental engraving sometimes is classed under the head of enchasing, but is properly called engraving, because the tools and manipulations are those of the engraver rather than that of the enchaser.

(*To be continued.*)

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Inventions Exhibition.

A great International Exhibition of Inventions and of Musical Instruments is to be held next year in the Exhibition Buildings, Royal Horticultural Gardens, South Kensington. The undertaking is under the patronage of Her Majesty the Queen. His Royal Highness the Prince of Wales, K.G., has consented to preside, and Sir Frederick Joseph Bramwell, F.R.S., V.P. Inst. C.E., will officiate as Chairman of the Executive Council. We cite a list of the exhibits of more especial interest to our readers:—

Group XIX.—Jewellery.

Class 105. *Jewellery and Personal Ornaments.*—Materials apparatus for manufacture, etc.

Group XXVII.—Clocks, Watches, and other Time-Keepers.

(For Electrical Clocks, see also Group xiii.)

Class 144. *Clocks.*—Timepieces and other domestic clocks; regulators and astronomical clocks; watchman's, calendar, turret, electrical and pneumatic clocks; hour-glasses, sun-dials, water-clocks.

" 145. *Time Signals, etc.*, Methods of controlling and synchronising clocks; apparatus for the distribution and signalling of time; also for the determination of time by astronomical observations.

" 146. *Watches and Chronometers.*—Examples illustrative of stages of manufacture and of the different types of watches and of chronometers; keyless, chronograph, repeating, calendar, and other forms of watches.

" 147. *Tools, etc.*—Lathes and mandrills; wheel-cutting engines; machine tools for producing the several parts of watches on the "interchangeable" system; various hand-tools used in the manufacture and repair of clocks and watches; gauges and templates; appliances used in case-making.

Electro-Plating with Nickel.

By William H. Wahl.

[A paper read before the Chemical Section of the Franklin Institute, and published in the Journal of the Institute.]

(*Continued from page* 27.)

ON account of the hardness of the deposited metal, nickel-plated articles cannot be burnished. In order, therefore, to obtain upon the finished work that superb metallic lustre which characterises this metal, it is necessary to polish the surface of the articles upon the buffing-wheel before immersion in the plating bath, in order that the deposited metal may be as smooth as possible, thus reducing the amount of subsequent buffing, required to finish the plated articles, to a minimum.

The operation of cleansing articles differs somewhat in various establishments; the following methods, however, are those usually followed:—

For copper, brass, Britannia metal, tin, pewter, etc., the articles are first steeped for a few minutes in boiling potash solution to remove greasy matter; they are then removed, dipped for an instant in cyanide of potassium solution of moderate strength, rinsed in water, again rinsed, then thoroughly brushed with the finest pumice powder (precipitated chalk and other fine powders are also used), again rinsed in water, dipped again for an instance in the cyanide, well rinsed, and then hung at once in the nickel bath. The time of immersion in the boiling potash solution will depend on the strength of the alkali, and the amount of greasy matter present. Tin, Britannia, and pewter, however, should be left in it as short a time as possible, as the alkali exerts a solvent action on tin and alloys containing this metal. When rinsed in water after removal from the potash, the water should wet the surface uniformly; should any cloudy patches be visible, these indicate that the grease has not been completely removed, and the article must be immersed again in the boiling potash.

Steel articles are first treated to the potash bath; rinsed in water, scoured with pumice powder (or its equivalent), rinsed, dipped for a moment in dilute hydrochloric acid, again rinsed, and at once hung in the depositing vat.

Cast iron is first placed in the potash bath to remove greasy matter, well rinsed, then allowed to remain for some time in a pickle of dilute sulphuric acid to partially dissolve off and partially soften the scale that covers it, rinsed, then thoroughly brushed with pumice, rinsed, dipped for a moment in dilute hydrochloric acid, again rinsed, and immediately placed in the nickel bath.

Many operators vary the above methods of cleansing somewhat, but they are followed substantially as given by the majority of nickel-platers. With Britannia metal, pewter, and other compositions of comparatively low conductive power, it is to be recommended to give them a preliminary coating of copper, for which purpose the cyanide bath is commonly employed. Many operators prefer also to copper articles of iron and steel preparatory to nickel-plating. The advantages secured are a better conducting surface upon which to lay on the nickel, and a more tenacious deposit, having in the case of a heavy coating of nickel less tendency to flake. Where a substantial and durable nickel deposit is required on iron and steel, and especially where the articles are to be exposed to the atmosphere, or will be subject to much handling, a preparatory coating with copper is almost indispensable. In the earlier days of nickel-plating it was the almost universal practice to first copper all iron and steel articles.

The enormous extension of nickel-plating of late years has caused its application to an endless variety of articles of trifling value merely to enhance their beauty, and this, together with the severe competition among those in the business has combined to cause a very general deterioration in the quality of nickel-plated work. The necessity of doing cheap work is responsible for the fact, therefore, that thousands of articles are turned out of the nickel-plating works with the merest wash of nickel. The want of durability exhibited by these inferior goods has had the consequence that many have formed a low estimate of the utility of nickel as a protective coating for metals, which it is far from deserving.

It is important that the work should be examined very shortly after it has gone into the nickel bath, to observe whether it has been "struck" and its general appearance. Should dark streaks exhibit themselves upon the work, they may indicate either that the current is too intense, or that the work has not been properly cleansed. Such streaks will often be observed, starting from joints, seams, or rivets, where the grease from the buffing-wheel may have secured lodgment, and from which it is difficult to perfectly remove it. In such cases the work must be removed and given another thorough pumice-brushing and rinsing, and again immersed in the depositing vat.

As has already been briefly noticed, the hardness of electro-deposited nickel renders it impossible to finish the plated articles by burnishing. It is, therefore, necessary to prepare the surfaces of the articles to receive the nickel deposited before they are plated, in order to reduce the subsequent finishing operations as much as possible. On this account it is customary to polish the surfaces of articles to be plated on buffing wheels. In case the surface is very rough, as is sometimes the case with articles of iron or steel, it may be necessary to grind it smooth upon the emery wheel. The work, when removed from the nickel bath, is dipped for a few moments into boiling water, and then rapidly dried in sawdust. It is now ready to be polished on the buffing wheels, when it is finished.

The length of time required to produce a sufficiently heavy deposit of nickel will depend on the strength of the current, the condition of the bath, and the character of the articles. Brass and copper articles usually receive a sufficiently heavy coating in half an hour; for wares on which an extra heavy coating is desired the time of immersion is extended to an hour or even longer. Iron and steel, Britannia metal, pewter, etc., require a longer time of immersion than brass or copper, even though given a preparatory coating of copper, because of their comparitively inferior conductibility. A good coating of nickel, properly laid on, possesses great durability, and with ordinary usage will last for many years.

Old nickel-plated work which it is desired to replate should first be "stripped," as is found necessary with the precious metals. For this purpose a mixture of sulphuric and nitric acids is commonly employed. Watt* recommends the following mixture, which will be found very serviceable, viz.:—"4 lbs. strong sulphuric acid, 1 lb. nitric acid, and about 1 pint of water." By volume, these proportions would be approximately—Strong sulphuric acid 2 parts, nitric acid 1 part, water 1 part. The acids should be added to the water under constant stirring. This stripping liquid may be used either cold or slightly warm. It acts promptly, removing a light coating of nickel in less than a minute, and a heavy one in a few minutes. To avoid contaminating the solution as much as possible with the metal of the wares, the operation should be closely watched and the articles removed from the acid just as soon as the nickel has been dissolved. The preparation of the stripped articles for re-nickeling should be the same as for new work. Articles may be stripped in the nickel bath by the ordinary artifice of connecting them as anodes, but the practice is reprehensible, as the purity of the bath will thereby become impaired by the solution of the metals composiug the wares. Where the current is used for the purpose, therefore, a separate solution should be used, and for this purpose Watt's suggestion to use as a stripping solution dilute sulphuric acid which will dissolve nickel readily without appreciably affecting brass, may be recommended. Under all circumstances, however, the articles should be looked at from time to time, and removed as soon as they are free from nickel. It is important, however, that the old nickel be thoroughly cleaned off, to prevent the peeling of the subsequent nickel deposit.

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* Watt, "Electro-Metallurgy" (7th ed.), 114 *et seq.*

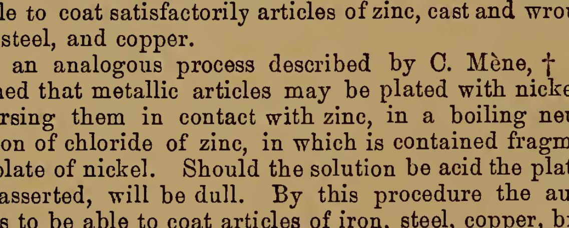
Plating with Nickel by Immersion.

Stolba [*] describes the following process for nickel-plating without the battery, which may be usefully applied in the case of small objects. He dilutes a concentrated solution of chloride of zinc with twice its volume of water. This mixture he boils in a copper vessel, adding a few drops of muriatic acid should there appear a precipitate of basic chloride of zinc. He thereupon adds a small quantity of powdered zinc. This addition causes a deposit of zinc upon the vessel. Thereupon sufficient chloride or sulphate of nickel is added to the bath to give it a distinctly green colour, and the previously cleansed articles are then immersed in the liquid in contact with zinc, and allowed to remain there for about fifteen minutes, the temperature being maintained at boiling during the operation. If the coating is found to be insufficient the articles are again immersed until a deposit of sufficient thickness is obtained. In this way, he claims to be able to coat satisfactorily articles of zinc, cast and wrought iron, steel, and copper.

By an analogous process described by C. Mène, [†] it is affirmed that metallic articles may be plated with nickel by immersing them in contact with zinc, in a boiling neutral solution of chloride of zinc, in which is contained fragments or a plate of nickel. Should the solution be acid the plating, it is asserted, will be dull. By this procedure the author claims to be able to coat articles of iron, steel, copper, brass, zinc and lead.

Where electrotypes of type or engravings are to be printed with coloured inks that are disposed to become chemically affected by contact with the usual copper surface (as, for example, vermillion, which becomes brownish) it is customary to give the copper electrotype a thin coating of nickel in the usual manner. This nickel renders the electrotype proof against the above-named difficulty that printers experience with electrotypes not so protected.

By methods and solutions analogous to those described for nickel, electro-deposits of cobalt may be obtained. The electro-deposits of this metal equal, if indeed they do not surpass, those of nickel, in whiteness and brilliancy of lustre. The costliness of the metal, however, prevents its use for this purpose.



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[*] *Journal Chemical Society*, xi. 465.

[†] *Chemical News*, xxv., 214.

Ancient Gems and Gem Engravings.

By James Prendeville.

(*Continued from page 182.*)

EGYPTIAN bas-relief (in *engraving* as well as statuary) appears to have been, in its origin, a mere copy of painting—its predecessor. The first attempts to represent the figures of the gods, sacred emblems, and other subjects connected with the divine and human form consisted in painting simple outlines of them on a flat surface, the details being afterwards put in with colour. But, in process of time, these forms were traced on stone with a tool, and the intermediate space between the various figures being afterwards cut away, the once level surface assumed the appearance of a bas-relief. It was, in fact, a pictorial representation on stone; which readily accounts for the imperfect arrangement of their figures. Deficient in conception, and, above all, in a knowledge of grouping, they were unable to form those combinations which give true expression. Every figure was made up of isolated parts, put together according to some general notions, but without harmony or preconceived effect. The expression of feeling and passion was entirely wanting; and the countenance of the king, whether charging an enemy's phalanx in the heat of battle, or peaceably offering incense in a sombre temple, presented the same outline and the same inanimate look. Nor do they appear to have had any clear conception of the effect required to distinguish the warrior from the priest, beyond the impressions received from characteristic costume, or from the subject of which the figures formed a part. . . . . Thus, then (as Diodorus, i. 98, observes of Egyptian statues), various portions of the same figure look as if they might be made by several artists in different places, the style and attitude having been previously agreed on, which, when brought together, would form a complete whole." Yet this appears never to have been done by the Egyptians, for all their figures on stone were of one piece; though he mentions a Greek statue of Apollo of Samos made in two pieces, by Telecles and Theodorus at Ephesus and Samos.

"In the reign of the second Rameses, some slight improvement was made in varying the proportions; but still the general form and character of the figures continued the same, which gave rise to the remark of Plato (book ii. *of Laws*), 'that the pictures and statues made by the Egyptians ten thousand years ago are no better or worse than what they now make.'[*]. . . . It must, however, be allowed that, in general, the character and form of animals (in portraying which they were not restricted to the same rigid style prescribed by the priests) were executed with great animation and an observance of nature. . . . . The mode of representing men and animals in profile, as was generally the case in Egyptian sculpture, is characteristic of a primitive stage of the art, and holds its ground until genius bursts through the trammels of usage. From its simplicity it is easily understood: the most inexperienced perceive the object to be represented; and no effort is required to comprehend it. Hence it is that few combinations can be made under such restrictions; but those few are perfectly intelligible, the eye being aware of the perfect resemblance to the simple exterior: and the modern uninstructed peasant of Egypt, who is immediately struck with and understands the drawings on the Theban tombs, is seldom able, if shown an European drawing, to distinguish men from animals; and no argument will induce him to tolerate foreshortening the omission of those parts of the body concealed from his view by the perspective of the picture, or the introduction of shadows, particularly on the human flesh."

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[*] However, this remark of Plato must be taken, with considerable qualification, to mean that no nearer approach to the Grecian excellence—to the *beau idéal* of perfection—was made then, than before.

Bas-relief may be considered the earliest style of sculpture. It originated in those pictorial representations, which were the primeval records of a people anxious to commemorate their victories, the qualities of a king, and other events connected with their history. As their skill increased, the more allegorical representation was extended to that of a descriptive kind, and some resemblance of the person was attempted; and what was at first scarcely more than a symbol assumed the more exalted form and character of a picture. Of a similar nature were all their historical records; and these pictorial illustrations were a substitute for written documents. Sculpture, indeed, long preceded letters; and we find that even in Greece, to describe, draw, engrave, and write were expressed by the same word, *γραφειν*.

The want of letters, and the inability to describe an individual, his occupations or his achievements, led them, in early ages, to bury with the body some object which might indicate the character and condition of the deceased. Thus warriors were interred with their arms, artisans with the implements they used, and priests with some utensil of their sacred office. In those times we find no inscription mentioned. A simple mound was raised over a chief; sometimes with a *στυλος*, or rude stone pillar, placed upon it, but no writing: and when, at a later period, any allusion to the occupation of the deceased was attempted, a rude allegorical emblem, of the same nature as the early historical records before alluded to, was engraved on the levelled surface of the stone.

Sculpture dates long before architecture, considered as an art. Architecture is a creation of the mind, having no model in nature; and it requires great imaginative powers to conceive its ideal beauties, and to give a proper combination of parts and a harmony of forms. But the desire in man to imitate and to record what has passed before him—in fine, to transfer the impression from his own mind to that of another—is natural in every stage of society.

As the wish to record events gave the *first*, religion gave the *second*, impulse to sculpture. The simple pillar of wood or stone, which was originally chosen to represent the Deity, afterwards assumed the human form—the noblest image of the Power that created it; and the memorial for the primitive substitute for a statue is curiously preserved in the Greek name *κιων*, implying a column and an idol. Pausanias (b. ii. c. 19) says, that "all statues were in ancient times made of wood, particularly those made in Egypt;" but this must have been at a period so remote as to be far beyond the known history of that country; though it is probable that when the arts were in their infancy the Egyptians were confined to statues of that kind.

Though the *general* character of sculpture continued the same, and a certain conventional mode of representing the human figure was universally adopted throughout the country, which was followed by every artist from the earliest era until the religion of the country and hieroglyphic symbols were abolished by the introduction of Christianity,—yet several styles were introduced, and the genius of the arts varied considerably during that lengthened period. This was especially so when Greek artists began to engrave Egyptian subjects.

All the best ancient authors bear united testimony to the fact, that the ancient Phœnicians made great progress in all the arts of civilisation and of peace. Not only was their commerce and their social intercourse extensive and varied with the neighbouring nations,—reciprocally communicating and receiving wealth, knowledge, and improvement,—but they carried their discoveries, their trade, and their arts to the remotest shores of the then known world. Their invasion of Ireland, and their establishment there of a colony, introducing and fixing in that country their institutions religious and civil,—a colony that spread over the country, disseminating and settling the Asiatic notions, and customs, and arts,—is a fact that, independently of the old Irish records, is proved by the researches of the most dispassionate historians and antiquaries. Strabo, Diodorus, Pliny, and other writers mention certain islands discovered by the Phœnicians, which, from the quantity of tin, or a metal bearing many of its properties, obtained the name of Cassiterides. This metal was mixed with other metals, particularly copper, and was employed, according to Homer (*Iliad*, xviii. 565, 574, 612, 474), for the relief-engraving on the exterior of shields, as in that of Achilles; for making greaves; binding various parts of defensive armour; and for household and ornamental purposes. These islands included Britain, at least the southern and western coasts of it. Strabo says (b. iii. *ad finem*), "The secret of the discovery was carefully concealed from all other persons; and the Phœnician vessels continued to sail from Gades (Cadiz) in quest of this commodity, without its being known whence they obtained it; though many endeavours were made by the Romans, at a subsequent period, to ascertain the secret, and share the benefits of this discovery. So anxious were the Phœnicians to retain their monopoly, that on one occasion, when a Roman vessel pursued a Phœnician trader bound to the spot, the latter purposely steered his vessel on a shoal, preferring to suffer shipwreck (provided he involved his pursuers in the same fate) to the disclosure of his country's secret. His artifice and fidelity succeeded. The Roman crew and vessel perished; and the Phœnician, who escaped, was rewarded, on his return home, from the public treasury for his devotion and his sacrifice."

Two remarkable evidences of the high degree of excellence to which the Phœnicians carried the fine arts (and among them the art of engraving), it will be sufficient to adduce here, these evidences being taken from the most unquestionable and ancient records we possess—the Old Testament and Homer. When Solomon was about to build the temple, one of the noblest monuments ever erected, he obtained his chief artist from Huram, king of Tyre, a Phœnician city (2 Chron. ii. 14). Huram, in his letter complying with the request of Solomon, says, "And now I have sent a cunning man, endued with understanding, skilful to work in gold, in silver, in brass, in iron, in stone, and in timber; also to grave any manner of graving, and to find out every device which shall be put to him, with thy cunning men, and with the cunning men of my lord David thy father."

The prize that Achilles gave to the best runner at the funeral games of Patroclus was a silver cup curiously wrought by the skilful artists of Sidon. (*Iliad*, xxiii. 740 of the original.)

> "And now succeed the gifts, ordained to grace
> The youths contending in the rapid race.
> A silver urn that full six measures held,
> By none in weight or workmanship excell'd:
> *Sidonian artists* taught the frame to shine,
> *Elaborate* with *artifice divine*:
> Whence Tyrian sailors did the prize transport,
> And gave to Thoas at the Lemnian port:
> From him descended good Eunæus heir'd
> The glorious gift; and, for Lycaon spar'd,
> To brave Patroclus gave the rich reward.
> Now, the same hero's fun'ral rites to grace,
> It stands the prize of swiftness in the race."

Indeed, Homer's words are far more expressive than Pope's translation, for he says—

> *αυταρ καλλει ενικα πᾰσαν επ' αιαν*
> *πολλον, επει Σιδονες πολυδαιδαλοι ευ ησκησαν—*

"in beauty it was greatly eminent all over the earth, *because* the variously accomplished artists of Sidon elaborated it with consummate skill."

This passage in Homer shows that the Phœnicians brought the arts to a high order of excellence at a time when the Greeks were only in the infancy of their civilisation, and many hundred years before the age of Solomon. Homer, who is supposed to have been a contemporary of David and Solomon, lived about 250 years after the Trojan war. Thoas, the king of Lemnos, to whom this highly wrought tankard, or cup, or urn (Homer calls it *κρητηρα τετυγμεκον* : now *κρητηρ* may mean either, and *τετυγμενος* in Homer often implies elaborate relief-work) was given by *Phœnician* mariners (*Φοινικες ανδρες*, not *Tyrian*, as Pope has it), lived in the time of the Argonautic expedition; for his daughter Hypsipale married Jason, the commander of the expedition, when he landed in Lemnos on his way to Colchis, and by him had Eunæus, who inherited this cup from his maternal grandfather, and gave it as the purchase for the captive son of King Prian. Homer does not state whether this vessel, when brought to Thoas, was new or old. He only says, it was famous all over the earth, or the land (for *αιαν* may signify either). But suppose it was brought to him fresh from the hand of the artist, it shows the advanced state of the arts in Phœnicia, when the Greeks were semibarbarous; for all historians agree that the ship Argo, which bore the Argonauts, was the first large ship ever launched by Greeks from their coasts, and that this expedition was the first distant one they ever undertook. The colonies which the Phœnicians established are sufficient evidence of the early cultivation and prosperity of that people. It is here sufficient to mention one—Carthage, which was so famous for its wealth, power, and knowledge of all the arts and sciences, that Virgil expressly says, at the commencement of the *Æneid*, that the queen of heaven peculiarly cherished and patronised it, as her earthly residence, even in preference to the refined Samos—that there were her own arms and her chariot. The great abundance of precious stones which they possessed, and their acknowledged ingenuity, taste, and wealth, brought the arts to a high state of cultivation.

Though we have undoubted evidence of the great progress made by the Persians at a very remote age in civilisation—indeed, Persian luxury and pomp were proverbial among the ancient Greeks,—yet there are no proofs of their having made any progress in the art of sculpture: but they did in architecture. The main causes of this were their system of religion and their aversion to naked images. They did not believe, like the Egyptians, Greeks, and other nations, that the gods had human form: they considered the elements only to be the proper representatives of the divine Power; and so they condemned all statues and images. Hence Xerxes is said to have destroyed, at the instigation of the Magi, or Persian priests or wise men, all the temples of Greece, because it was thought impious to confine within walls the gods, to whom all things were open and free, and whose temple should be the whole world. But there was another cause of their imperfect proficiency in the arts of sculpture and painting—their dislike of naked images, which alone are favourable to the full and elegant development of the human form. All their figures were wrapped up in drapery; and these figures were not so much intended to represent the actual features, attitudes, and emotions of the originals, under the varied circumstances of their condition, as to become general memorials of them.

The first European people who adopted the arts of the Egyptians, especially sculpture in its various departments, were the Etruscans—a people who reached a high degree of prosperity and civilisation, when Greece was in its state of transition from barbarism. Thus Hayley speaks of Etruria (*Epistle* iv.):—

> "Artists defrauded of their deathless due,
> Who once a glory round Etruria threw;
> When, with her flag of transient fame unfurled,
> She shone the *wonder* of the *western world—*
> *Eclipsing Greece, ere, raised to nobler life,*
> *Greece learned to triumph o'er barbarian strife.*"

The Etruscans had at an early age extensive commerce with the Egyptians, Phœnicians, and other civilised nations of the East, and borrowed from them their arts, which their own native genius and taste enabled them to cultivate and improve with great success. Peace and commerce brought them wealth; this introduced refinement and luxury; and the art of engraving precious stones, glass and compound substances, which were known to the Egyptians, became one of their favourite pursuits. The curiously wrought vases, and other sculptured relics of that people, which have been preserved to us, bear ample testimony to their industry, skill, and elegance. The Etruscans, who had borrowed many of their subjects and much of their general design of engraving from the Egyptians, adhered, however, much more to verisimilitude and nature. For instance, their engraved figures of the *scarabæus* were more in accordance with the natural size of the animal; whereas the Egyptian figure of it was, in their usual habit of giving large proportions to everything, sometimes four inches long. Etruscan art evidently seems to have been in an intermediate or transition state between Egyptian and Grecian accomplishment. The Etruscans, while they adopted many of the outlines of the definitive characteristics of the angular Egyptian style, yet improved on it considerably, by giving them a comparative rotundity, smoothness, and a character of elasticity. Notwithstanding all this, their style of sculpture and engraving still retained much of the Egyptian in elongation of limb and stiffness of attitude. But it was their evil destiny to be placed in the neighbourhood of Rome, whose pursuit was mainly war—whose ambition was conquest—and whose lust was plunder. Their flourishing confederation of twelve states, each ruled by its *lucumon*, and possessing a representative form of government, was lost in the encroachments of those rude and unscrupulous republicans—the Romans. With their independence sunk their hearts; and never revived. It is true that, when Rome emerged into refinement, the monuments of Etruscan science and taste which escaped were cherished and admired; but the art irretrievably perished with Etruscan liberty.

It is allowed that the early Romans adopted from them many of the ceremonials, and much of the substance, of their religion—the fundamentals of many of their best civil institutions—their robes of office, and the insignia of state pageantry; and Ammianus Marcellinus, a historian of much research and scrupulous accuracy, states that they were acquainted with the triumphal procession, and all its accompanying circumstances, one thousand years before Rome. At least, it is clear that during the Roman monarchy they carried some of the arts to perfection, and were rich in curious and costly ornaments, which they carried about them; for Dionysius of Halicarnassus records that the elder Tarquin, having conquered one of the Etruscan states, despoiled the magistrates of the engraved and precious rings they wore.

As it does not come within the scope of this brief essay to descant on the civilisation of Etruria, it may be well to refer the curious reader to Dempster, Gori, Buonarotti, the Latin dissertations of Posseri, and the Saggio di Lingua Etrusca dall' Abate Lanzi. It is here sufficient to remark, that the concurrent testimony of those authors who have sifted the inquiry with judgment, impartiality, and care proves Etruria to have been the first country on the continent of Europe that rose to civilised prosperity, and cultivated the sciences and all the polite arts of peace with diligence, success, and renown.

The Greeks, in the progress of their own civilisation and the diffusion of Egyptian commerce, acquired from the Egyptians a knowledge of their arts, as they borrowed from them much of their philosophy and religion. When once in possession of the art of engraving, they soon brought it, like the other arts of fancy and delineation, to the highest imaginable perfection. Raspe justly observes, that "their improvements were not so much improvements in the *mechanical* parts of the art, *i. e.* the tools or method of engraving (for these, from their simplicity, could undergo but little variation), as in a more extensive and varied use of the tool, and in a better choice and happier treatment of the subject, from their superior knowledge of anatomy and their imitation of nature." One cardinal defect pervaded Egyptian sculpture, *i.e.* rigid immobility: the limbs appear stiff, angular, clumsy, and inactive. The Egyptian style was the colossal and the imposing; the Grecian, the delicate and the fascinating, breathing, as it were, life into a figure, and touching into motion the group contained within the small precincts of a ring. The commercial intercourse of the Greeks with other nations, especially Egypt, Phœnicia, and Etruria—the constant emulation between the many independent states into which Greece was divided—the encouragement given by ingenious and aspiring artists to the industrious and successful cultivation of mechanism and science—the athletic exercises of the people—the natural symmetry and beauty of their forms—the diversified and charming scenery of their country, together with the genial influence of the climate,—all tended to give an impulse to their genius and a consummation to their art. To all these causes and qualities a great propelling force was given by the varied enchantments of their mythology, which widely differed from the cold, dry theology of the Asiatics and Africans. It was by the study of Nature and her laws that the Greeks formed their immortal works—her alone they adored—she alone was their object, standard, and test of art and science, of genius and of taste.

It is impossible to trace with any accuracy the origin or the gradual stages of the advancement of the art among the Greeks. Pliny, following the traditional accounts of the Greeks, states (*Nat. Hist.* vii. 56), that "Dædalus invented he carpenter's tools, particularly the saw, plumb-line, auger, and glue of isinglass; but that the rule, level, turning-lade, *lock and key*, were invented by Theodore the Samian." But the only Samian artist of the name of Theodorus, whose history is known to us, was the artist who engraved the famous emerald ring of Polycrates, king of Samos, and the contemporary of Amasis, king of Egypt. The story of this ring it may be here right to give; for the era of Polycrates and Amasis may be justly considered as the period from which we date an acquired excellence of the pursuit of art, of science, and philosophy in Greece. Polycrates having enjoyed a long and singular career of uninterupted prosperity, was advised, by his friend Amasis, to cast away, as a counterpoise to his prosperity, the possession he valued most, and whose loss would most afflict him. Polycrates, acting on the advice, rowed out to sea, and, in presence of the chief men of his court, flung into the water a signet-ring of inestimable value, which he was wont to wear—an emerald, set in gold, beautifully engraved—the work of Theodorus. (Yet Pliny (xxxvii. 2) and Solinus (c. 33) say it was a sardonyx.) So much did he prize this gem, that on his return to the palace he gave way to extreme grief. But in a few days a fisherman sent him, as a present, a large and beautiful fish, which, when opened, was found to contain the identical ring. When Amasis learned this, he renounced all connection with him, as being a man doomed by Providence to destruction—a foreboding that was afterwards realised. The gem of Pyrrhus, king of Epirus, engraved with the figures of Apollo and the nine Muses (in which the spots and various colours of the stone were singularly adapted to the attributes of each character portrayed on it), also obtained much celebrity among the ancients.

It is quite evident that the use of the key was known in Homer's time; for he describes Juno (*Iliad,* xiv.) as opening her cabinet with a *secret key.* That engraving was not only known, but carried to high perfection, in his time is, among many other proofs, attested by the simple fact of his wonderful description of the metal figures on the sculptured shield of Achilles—figures so executed to the life, that he intimates you could imagine you saw them move and heard them speak. Æschylus says, the shields of the seven chiefs of the Theban war—a war antecedent to the Trojan—had emblematical devices engraved upon them. Nor are we dependent on Homer and Æschylus alone for evidence of the antiquity of the art among the Greeks; for we have the authority of Hesiod as well, in his description of the shield of Hercules.

When the art of engraving in Greece arrived at a high order of execution, the use of signet-rings and engraved stones was not restricted to particular persons or certain ranks, but extended to the people, either as presenting the image of some favourite divinity to the adoring eye of the votary, and so attaching his confidence and fortifying his belief; or perpetuating some signal deed achieved by the possessor of the gem, or by his ancestor, or some hero who had enlisted his sympathies and won his admiration. Thus the perfection of the art gave value and circulation to the engraved stones; while their general estimation and use reciprocally acted in giving encouragement to the art.

In the age of Polycrates there was much intercourse between Greece (which was then rising rapidly to civilisation) and Egypt. It is stated that he was instrumental in introducing Pythagoras to Amasis, and so enabled him to obtain facilities for studying the religious mysteries and occult sciences of the Egyptians,—a privilege that few (if any) strangers before were permitted to enjoy. It is also stated, that Solon visited Egypt in the reign of Amasis; and having got opportunities of learning the laws and religion of the country, transplanted into Greece many of its religious and political institutions. Many other eminent Greeks, Homer, Thales, Plato, etc., at different times visited Egypt, and derived from it much of their philosophy and learning.

From Dædalus to the time immediately preceding Phidias there intervened a period of about 800 years in attaining a complete delineation of the human form and its various attitudes. It would be tedious and uninteresting to quote here the few fragments of history left to us, to give a shadowy outline of the gradations through which the art slowly but surely crept on to perfection.

About 500 years elapsed between the age of Homer and that of Solon and Pythagoras, who lived about 500 years before the Christian era. That the art of engraving acquired importance we have evidence from one of his laws, which forbade engravers to keep or make copies of seal-rings; lest, no doubt, fraudulent use might be made of them. (Diog. Laer. *in vit. Solon.*)

The first great impulse was given to Grecian skill and talent, after the establishment of Grecian independence, by the rout of the Persian invaders. Then they were free to turn their attention to the cultivation of the domestic arts, as well in drawing isolated figures as groups. From this time all the arts advanced with prodigious strides, till the age of Alexander, when they reached their utmost perfection. For many ages they still upheld their excellence; but, in some degree, fell off towards the Roman occupation of Greece. However, Raspe says that "the arts arrived at perfection in the time of Pericles; and so continued through the age of Alexander and his successors, up to the middle of the third century of the Christian era, long after the age of

Augustus, *i.e.*, about 1250 years of success from the time of Homer."

We have a remarkable instance (told by Lucian in his Συγγραφειν, or *Treatise on History*) of the love of future fame which animated the Grecian artists; and this love tended much to their success. Sostratus, who was employed by Ptolemy to erect the famous lighthouse on the island of Pharos, inscribed on the outside the name of the king; for the king wished that his own name, on a structure so remarkable, "dedicated to Jove the Saviour, for the good of mariners," should be perpetrated—not the name of the architect. But thus the artist foiled his design. He carved into a solid block of stone, presenting a prominent view to the open sea, his own name: over this he put an incrustation of mortar, on which he inscribed the name of Ptolemy. Time and weather soon swept away the mortar and the imposing superscription, together with all remembrance of the beneficence of Ptolemy; while his own name, as the constructor of that great and useful work, was exhibited in indelible characters for ages.

The most celebrated engraver of Greece was Pyrgoteles, who lived in the time of Alexander, and alone was privileged to engrave his image, as Apelles was to paint his picture and Lysippus to make his statue. Next to Pyrgoteles, Pliny (xxxvii. 1) ranks Apollonides and Cromius the elder. He also makes honourable mention of Teucer. Scylax and Admon acquired great eminence before the time of Pericles. Among the eminent engravers of the Periclean age may be mentioned Polygnotus, Mycon, Pamphilus and Plotarchus; and in the time of Alexander, Pyrgoteles, Aëtion, Apollonides, Solon, Sostratus, and Cromius the younger, were the most celebrated. In general it may be remarked, on the authority of the best authors on this subject, that the ancient sculptors and engravers must have been thoroughly acquainted with the principles of mathematical science—with the laws of proportion and anatomy—to enable them to execute their figures with so much elegance, force, and fidelity to nature. Vitruvius (b. iii.) lays down some rules adopted by the most celebrated Grecian artists, taken from their own writings, for defining the symmetrical proportions of the human figure, as well as the geometrical lines which circumscribe its general form, attitude, and general motion.

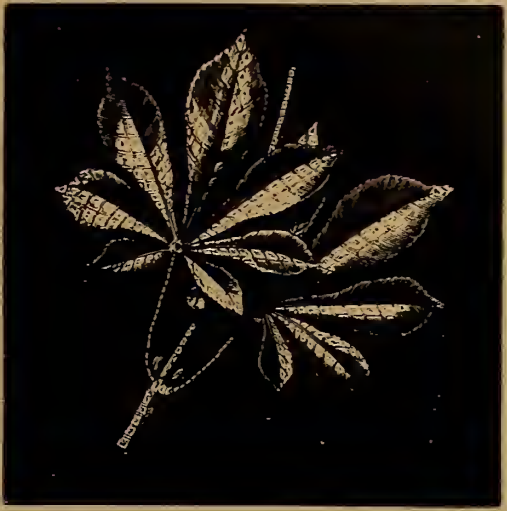
The Romans were for a long time debarred by their religious institution from using engraved stones to perpetuate the symbols, the ceremonials, or the mysteries of their religion; for Numa, the chief founder of their theology, following in many things the precepts of Pythagoras, conceived that a knowledge of the Divinity (as the Supreme Being was not an object of sense, or liable to human infirmity, but invisible and incorruptible) could only be acquired by the *mind*, and imagined that it was derogatory to employ material and perishable objects to represent it. (See Plutarch, in his life of Numa.) But this fastidiousness gradually died away with the progress of their polytheism, and with their growing knowledge of the refinements of other nations.

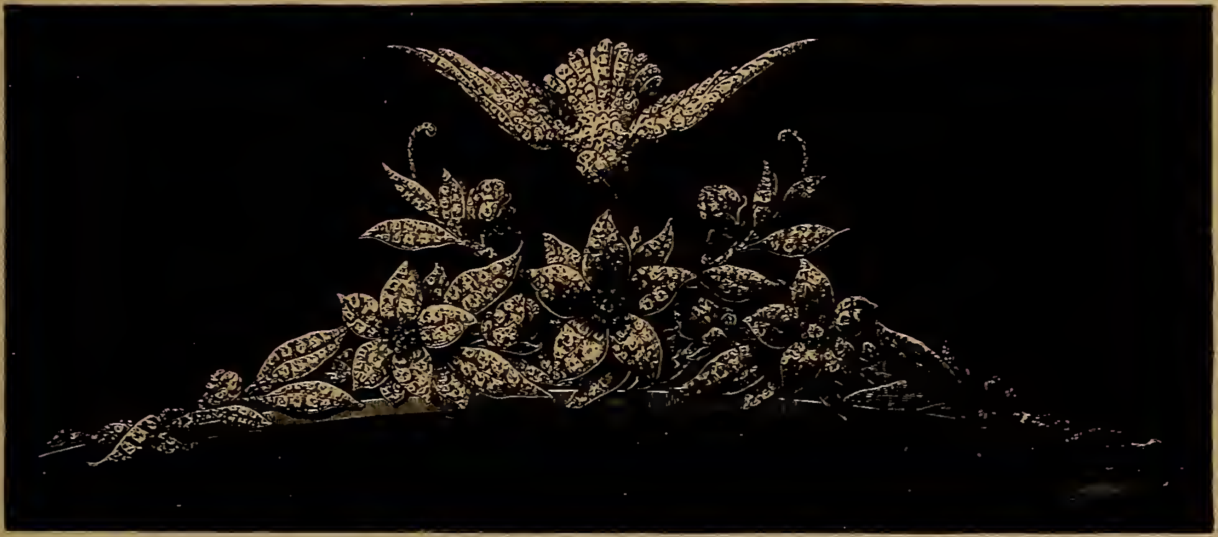
After the Romans had possessed themselves of the spoils of conquered Etruria, and began to acquire a knowledge of Grecian art, a passion, and even a taste, for engraved gems began to spread among them; and as these curious treasures acquired by their arms were inadequate to the public demand, ingenuity was taxed to supply the deficiency. Then their caprice invented all kinds of subjects to be engraved on their seal-rings. Rings were, during the republic, the distinctive mark of the nobility. When a gold ring was bestowed on a plebeian, as the reward of merit, by a dictator or a quæstor, he was admitted into the equestrian order. On the other hand, whenever a Roman knight had dissipated his fortune, or became unworthy of his rank, he was compelled to resign his gold ring; and if any disgraceful act disqualified a citizen from holding a public office, he was deprived of his ring; and even his seal was erased (Pliny, xxxii. 12). But towards the close of the republic, and during the first ages of the empire, a multiplicity of rings, which had been hitherto prohibited, was allowed; and, from having been originally used as seals, they became curious and necessary ornaments to every family—at least to every family and person of respectability and station. The Romans frequently covered all their fingers with them, and even carried several on one finger; and often mounted several engraved stones on one ring (Macrob. vii. 3). Pliny says, they loaded their fingers with princely fortunes; and they became so luxuriously fastidious, that some had their summer and their winter rings. Juvenal (Sat. i.) describes Crispinus as waving his delicate finger "to cool his light summer ring, being unable to bear the weight of the massy winter *gem*." They not only used their engraved rings to seal their letters and cabinets, but sometimes as keys,—one part of the seal forming the wards of a key. As the head of every family had his own ring, no engraver was permitted to make the same ring for two different persons. These gem-rings they were most careful in preserving. Pompey (the son of Pompey the Great), anticipating his melancholy fate, flung his signet-ring into the sea, to prevent his enemies from converting the application of it to their own purposes after his death (Flor. iv. 2; Paterc. ii. 55). At the bed of a dying man, his friends and heirs stood anxiously waiting for the disposal of his ring, this being considered an index to his last will. This custom was not peculiar to the Romans; for we find evidence of it among the Greeks. When Alexander the Great was on his death-bed, he was asked about his wishes respecting the appointment of his heir, or the partition of his empire. He made no reply, but gave his ring to Perdiccas. This has been pronounced, by all historians, a sufficient indication of his will. Many, from various motives, ordered the signet to be enclosed in their funeral urn. But if the dying man gave no directions about it, they took it from his finger, sometimes even before he expired,—a practice that Scena laments as one of the reprehensible manners of his age.

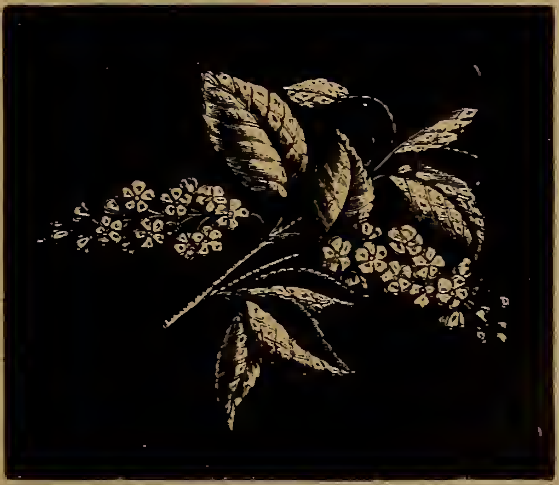
"At Rome chiefly," observes Raspe, "the engravers and their art had encouragement much beyond anything our times and fashions permit our artists to expect. Seals were not their only care: such was the magnificence and taste of the ancients, that the art was applied to the working of the richest jewellery, for individual wear and ornament, and for adorning the statues of the gods. Not only bracelets, earrings, clasps, girdles, etc., were ornamented with gems; but even the robes, gowns, and shoes of the opulent and the elegant were richly set and variegated with engraved stones. The emperor Heliogabalus is stigmatised by Lampridius for wearing such ornaments on his shoes and stockings; 'as if,' says he 'the works of the celebrated artist could be admired in seal-rings worn on the toes.' The same taste and profusion sometimes adorned the helmets, breastplates, sword-handles, and even the saddles of their military men. The large cameos had their place in cabinet-work and furniture; and thousands of gems were set in gold and silver goblets, vases, etc., which glittered on the sideboards of the opulent or in the temples of the divinities. We have still left, for our astonishment, beautiful cups and vases of solid onyx, sardonyx, and rock-crystal, exhibiting the finest relievo-work."

(*To be continued.*)

MONTHLY SUPPLEMENT OF DESIGNS.







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ILLUSTRATED SUPPLEMENT:—"Designs for Modern Jewellery."

The Patents, Designs, and Trade Marks Act of 1883.

By C. Stuart Murray.

(*Continued from page* 37.)

We spoke, in our last, of the provisions applying to foreign countries where mutual agreements had been entered into, and we will now mention the application of the Act to the Colonies and India. Where any British possession has made satisfactory arrangements for the protection of inventions, designs, and trade marks patented or registered in this country, it shall be lawful for Her Majesty, from time to time, by Order in Council, to apply the provisions of the last preceding Section, with such variations or additions, if any, as to Her Majesty in Council may seem fit, to such British possession.

An Order in Council under this Act shall, from a date to be mentioned for the purpose in the Order, take effect as if its provisions had been contained in this Act; but it shall be lawful for Her Majesty in Council to revoke any Order in Council made under this Act.

Offences.—We now come to that part of the Act which has a special interest for every one concerned in manufactures that have to deal with the subjects coming under the discipline of the new law, and that relates to breaches of it. This part of the Act will touch a very numerous class of persons, and throw a goodly number of stamping-dies out of work. The 105th Section lays it down, that any person who represents that any article sold by him is a patented article, when no patent has been granted for the same, or describes any design or trade mark applied to any article sold by him as registered which is not so, shall be liable for every offence on summary conviction to a fine not exceeding five pounds. A person shall be deemed, for the purposes of this enactment, to represent that an article is patented, or a design or a trade mark is registered, if he sells the article with the word "patent," "patented," or "registered," or any word or words expressing or implying that a patent or registration has been obtained for the article stamped, engraved, or impressed on, or otherwise applied to, the article.

There seems in this section to have been either an oversight or some special consideration for expired patents. The question arises as to whether or not such patents shall have a continuous right to the name, although no legal right exists? Suppose that a person were to invoice an order for a certain article to a customer as thus:—"100 patent studs," etc., and that the customer refused the goods upon the ground that he had not ordered, and did not want, the patented articles. Could he be compelled to take and pay for them? Let us put a case. If the seller goes into Court, how will he claim? Why, upon the order and the invoice. What will the defendant customer plead? That he never ordered patent studs at all, and does not intend to pay for them. The plaintiff, in proving his share in the transaction, is then cross-examined upon the patent, and he can only make one answer, namely, that it has run its course and is dead. He has no further *locus standi* whatever in Court. We think that it would hardly go down with the judge to say, "But it is well understood in the trade that the word 'patent' is always used when there is no patent whatever." The judge is upon the law, and he would be likely to say, "There is no custom of the trade that will justify you in giving a misdescription, and insisting that it shall be accepted. There are your goods, and you must submit to a nonsuit and pay the costs." That seems to us to be the only legal way out of the business, and therefore, such being the case, it is difficult to see what benefit the retention of the word "patent" can be, now that customers are becoming so enlightened upon such matters. Suppose, again, that a private customer bought an article over the counter, and during the bargaining made some remarks about the price being rather more than it ought to be, and was answered, "But it is a patented article" He paid, and went straightway to the Patent Office, finding there that the patent was out. He next came back to the shop and claimed the return of his money, which was refused. Another step in the transaction landed them both in the County Court. Is it to be supposed that the judge would sustain the seller against the sworn information of the buyer, that the price asked for was paid solely on account of the representation that the article was a patent one. We are very much of opinion that the money would have to be refunded, anything "well known to the trade" notwithstanding. We are now only surmising that, through the general public having taken such an interest in the new law, the principles of the cases put forth here may arise.

Another stringent feature in the new law has created a great deal of discussion and a large amount of ridicule; and that is with respect to the use of the royal arms by tradesmen. The stories that have been told about these said royal arms would make an amusing little book, from lending the queen an umbrella in the Highlands, to a penny bun in the Isle of Wight. The same in a more comical degree may be said of the Prince of Wales. We dearly love titles and titled folks in Great Britain, whilst our childish fondness for royal arms over our shop doors has provoked a check. The most pardonable exhibition of innocent vanity in this way we discovered about two years ago. Rambling one cool afternoon among the colonies of Slumland, as is our wont at times, we passed into one of the better kind of places, and there, to our astonishment, we found the royal arms surmounting a small tin sign, nailed upon the window-crown of a cellar home. Upon the sign was painted, "Mangling Done Here like the Royal Laundries." Further inquiry got at the information that the "old lady" had been in her early days in some kind of service or other at the Windsor laundries. Will the new Act be able to touch her golden royal arms and her nicely gilt mangle underneath them?

The law now says that any person who, without the authority of Her Majesty or any of the Royal Family, or of any Government Department, assumes or uses, in connection with any trade, business, calling, or profession, the Royal arms, or arms so nearly resembling the same as to be calculated to deceive, in such a manner as to be calculated to lead other persons to believe that he is carrying on his occupation under royal or governmental authority, shall be liable upon summary conviction to a fine not exceeding twenty pounds.

Probably, there was never an Act of Parliament without its cobweb—that is, without its weak thread, and some parts of this one offer no exception to the rule. There are thousands of "royal arms" upon shop fronts all over the country, but what do the people who see them every day care about them? Not a straw. The words of the Act upon the point are, "calculated to deceive," and, "calculated to lead other persons to believe," etc. Now, of all the gilt lions and unicorns, and all the rest of it, that we have seen, how many of them have led us to believe that the owners had even as much connection with royalty as the old lady and her mangle that we have spoken of? From this view of the question, a magistrate would in the nature of the thing ask who had been deceived; and in putting forward that proof would be the difficulty. Now, it appears to our non-legal mind that, if the clause had merely forbidden under penalty the display of the royal arms, without any "believing" or "deceiving" whatever, and made the police the executive authority, and no other persons, the whole matter would have been simplified, and the royal arms must have been shipped abroad as peace offerings to the Mahdi and other Egyptian chiefs on the banks of the Nile, to run up and shake hands with Gordon, Baker Pacha, and all the rest of them. As it is, we think that in most cases the royal arms can be very well let alone. Here is a suggestion to save the royal arms from being dismounted. Let every one who has them up, place in suitably sized gilt letters conspicuously near them this sentence:—"Behold the sign of our loyalty." There is no magistrate with ordinary common sense who could be misled into granting a summous for "deceiving," with such a declaration as that staring him in the face. Invoices, billheads, notepaper, cards, and all other stationery could be treated in the same way. It is very doubtful, though, even if no precaution is taken, whether the law upon the subject will ever be put into force. Still, people who use the royal arms for or "in connection with any trade, business, calling, or profession," can do no harm in looking after themselves. It seems an odd, out-of-the way freak of legislation to lug in such a clause at the end of a patent law. They might as well have forbidden under peualty all silversmiths from making "Queen's pattern" spoons and forks, and have left people to a closer admiration of "threads" and "fiddles."

Scotland, Ireland, and the Isle of Man have certain special clauses for themselves. In any action for infringement of a patent in Scotland the provisions of this Act, with respect to calling in the aid of an assessor shall apply, and the action shall be tried without a jury, unless the Court shall otherwise direct; but, beyond what is said here, nothing shall affect the jurisdiction and forms of process of the court in Scotland in such an action or in any action or proceeding respecting a patent hitherto competent to those courts. The "Court of Appeal" shall mean any court to which such action is appealed. Punishable offences may be prosecuted in the Sheriff Court, and proceedings for revocation of a patent shall be in the form of an action of reduction at the instance of the Lord Advocate, or at the instance of a party having interest with his concurrence, which concurrence may be given on just cause shown only. Service of all writs and summonses in that action shall be made according to the forms and practice existing at the commencement of this Act.

With respect to Ireland the law says that all parties shall, notwithstanding anything in this Act, have their remedies under or in respect of a patent, as if the same had been granted to extend to Ireland only.

The provisions of the Act conferring a special jurisdiction on the Court, as has been defined, shall not, except as far as the jurisdiction extends, affect that of any Court in Scotland or Ireland in any proceedings relating to patents or to designs or trade marks; and with reference to any such proceedings in Scotland, the term "the Court" shall mean any Lord Ordinary of the Court of Session, and the term "Court of

Appeal" shall mean either Division of the said Court. With reference to any such proceedings in Ireland, the terms "the Court" and the "Court of Appeal" shall mean respectively the High Court of Justice in Ireland and Her Majesty's Court of Appeal in Ireland. If any rectification of a register under the new law is required in pursuance of any proceeding in Scotland or Ireland, a copy of the order, decree, or other authority for the rectification, shall be served on the comptroller and he shall rectify the register accordingly. As the Act extends to the Isle of Man, nothing in the clauses shall affect the jurisdiction of the Court in that place in proceedings for infringement or in any action or proceeding respecting a patent, design, or trade mark competent to those courts.

The punishment for a misdemeanour under the Act in the Isle of Man shall be imprisonment for any term not exceeding two years, with or without hard labour, and "*with* or without a fine" not exceeding one hundred pounds, at the discretion of the Court. Any offence under this Act committed in the Isle of Man, which would in England be punishable on summary conviction, may be prosecuted, and any fine in respect thereof recovered at the instance of any person aggrieved in the manner in which offences punishable on summary conviction may for the time being be prosecuted.

It is notified that all the Acts or portions of Acts that have been repealed by the new law shall not affect the past operation of any of those enactments, or any patent or copyright or right to use a trade mark granted or acquired, or application pending, or appointment made, or compensation granted, or order or direction made or given, or right, privilege, obligation, or liability acquired, accrued, or incurred, or anything duly done or suffered under or by any of those enactments before or at the commencement of this Act. Nor shall those repeals interfere with the institution or prosecution of any action or proceeding, civil or criminal, in respect thereof, and any such proceeding may be carried on as if this Act had not been passed. Nor shall they take away or abridge any protection or benefit in relation to any such action or proceeding. The old registers of patents and of their proprietors under any of the repealed enactments shall be held to be parts of the same register book as the register kept under the present law. And the same is to apply to designs and trade marks.

A very important clause comes in here. That all general rules made by the Lord Chancellor, or by any other authority under any enactment repealed by the new law, and in force at its commencement, may at any time afterwards be repealed, altered, or amended by the Board of Trade, as if they had been made by the Board under the present powers. Such general rules, so far as they are consistent with, and not superseded by the new clauses, shall continue in force as if they had been made by the Board of Trade itself.

Nothing shall take away, abridge, or prejudicially affect the prerogative of the crown in relation to the granting or the withholding of any letters patent whatever.

The substitution of fine and imprisonment for offences committed against the Act carries an important meaning with it. It seems as if the authorities in England had some misgiving about the efficacy of money penalties alone when inflicted in the Isle of Man. Hence the imprisonment "with or without hard labour." There has long been a very deep feeling, not unmixed with indignation, that in the matter of breaking the law, the monied man has a practical immunity which the poor man does not possess. We see it every day in some shape or another, outside as well as inside the patent laws. When a rich man has been infringing a patent, or a firm has been doing so, and are fairly caught, there is the one stereotyped answer, "We suppose we can get off by paying." Or it may be thus : "We will fight him through every Court and beggar him, if he has anything to be beggared of, or we will beat him." Of course, we are speaking now of very unprincipled men, of whom, thank Heaven, there are comparatively few of this kind, but still there are a sufficient number to rob the invariably poverty-stricken inventor. As there are such men, it is only justice to say that there are many notable and noble examples upon the other side. Men who are only too glad to place a useful invention before the world, and help the inventor if they see that they may gain a fair recompense for themselves without risking too much of their money. The heavy load that drags the poor inventor down to the earth is the facility with which the "pirate" can haul him through one Court after another, ending only with the House of Lords—a living death to him for years and years. A melancholy history could be written of struggles of this kind, in which the inventor was unable to go to a *third* court, and not putting in an appearance, the oppressor had it all his own way, and went to his office rejoicing in his iniquity. Indeed, a brother of one of our deceased judges was so robbed and tortured by infringements of a most valuable patent, that although he beat all his tormentors in the end, the advent of victory materially shortened his life. In fact a society was formed, upon the subscription plan, to "infringe away," and fight him in the law courts, until, at a hearing, one of the judges declared from the Bench that every member of that society came well within the law of conspiracy in thus banding themselves together to deprive a citizen of his legal and indefeasible rights. That put an end to the infamous business, and they speedily made terms with him and dissolved. But, unfortunately, he never recovered the wearying and the worrying of years. It is to be hoped that the new Patent Act will do much to render such conduct impossible in the future.

We have concluded our comments upon the Act itself, and said last month that we should take our leave of it. It so happens, however, that since we so wrote a number of important rules connected with it have come into our hands; and, as they are of quite as great an interest to the patentee as any other part of the law, there is nothing for it, but to give them in a final paper in the ensuing number.

Foreign Items.

From the *Impartial* (Chaux-de-Fonds newspaper) we gather that there are at the present on the register of the Chamber of Commerce 406 watch manufacturers in the Canton of Neuchâtel alone. They are divided as follows:—La Chaux-de-Fonds, 207; Locle, 80; Fleurier, 36; Neuchâtel, 34; Brenets, 12; Ponts-Martel, 12; Colombier 5; Buttes, 5; Cernier, 2; Cormondrèche, 2; Eplatures, 2; Fontainemelon, 2; Couvet, 1; Marin, 1; Môtiers, 1; Peseux, 1; Sagne, 1; Saint-Sulpice, 1; Verrières, 1. From the same source we learn that at the Bureau of Control of Chaux-de-Fonds in the month of August of this year 24,565 watch cases have been Hall-marked. Of this number 20,078 were in gold, and 4,487 in silver.

A course of theoretical and practical instruction on the adjustment of watches of precision has just commenced in Chaux-de-Fonds, and is already a success; the two classes being numerously attended. This idea is worthy of imitation, and it certainly proves that the Swiss watch manufacturers intend training labour, which shall be able to do the best work, and that in future chronometers will come in for a good share of attention. A. F.

Colouring of Gems, etc.

In the name of *Gemmæ*, the ancients embraced more precious stones than we of modern date do by that of jewels; this only comprises precious stones which, from their colour, transparency, fire, hardness, scarcity and other properties, are eminently qualified to serve as adornments. The ancients held in high esteem the many varieties of quartz, half-jewels, parti- as well as singly coloured, or veined, cloudy, or spotted, because they furnished an excellent material for the pursuits of art, and as being better adapted to the art of cameo cutting. Pliny mentions an agate which, with its natural spots, represented Apollo surrounded by the nine Muses. It is not a matter of astonishment that the ancients should have practised every means within their knowledge to alter or heighten the colorization of the various tinged quartz classes; and, indeed, Pliny states that there is no falsification as lucrative as that of artificially colouring gems. They were manufactured of glass and paste, and cemented upon tablets; especially the sardonyx was much imitated. The same author states that, among other manipulations, the quartzose gems were boiled in honey for seven days. The agate cutters of Idar and Oberstein made use of the same means to change feebly-coloured gems — chalcedonies, cornelians, into pronounced and very beautiful onyxes. The gem-cutters of Italy in former years visited these gem-producing regions, and eagerly bought up everything in the market, as they understood the art of artificial staining, until some traitor among them gave or sold away the secret which Pliny already mentions as being practised at the time of the birth of Christ.

This art is based upon the peculiarity that some of the bands of the chalcedony are more porous than others, and will imbibe colouring fluids, whereby they may be changed into onyxes, specially adapted to cameo cutting, owing to their different shades; and even agates intended for other purposes, may be considerably enhanced by the procedure.

An empyrical way of ascertaining whether a stone will imbibe colour is practised by the gem merchants, by breaking off a small piece and wetting the larger one with the tongue; if several strata imbibe the fluid, the stone is deemed good. Very large ones, plentifully veined, especially those containing red streaks, are valued highly, increasing with the number of veins. One was found in 1844, weighing 100 pounds, which sold for £120 on the spot; it was cut into cameos, at an expense of £30, which brought, when sold £400.

The colouring is done in the following manner: The stones are first washed very clean, to free them from all extraneous matter, and dried in the ordinary temperature; they are next immersed in a solution of honey and water; the pot must be new, or at least, very clean, above all, free from grease. It is placed into hot ashes, or upon a warm stove, the fluid, however, must never come to ebullition, and the stones are at all times kept under water by adding a quantity every day or two, to replace that which evaporated. The stones thus are left for two or three weeks, then taken out, washed, and put into another pot, into which sulphuric acid is poured, to completely cover them. The pot is covered with a slate, placed into the hot ashes, and surrounded with live coals. The large so-called soft stones will be found coloured within a few hours, others require an entire day, while again others do not become stained. When to satisfaction, the stones are taken out of the acid, washed, dried upon a stove, cut and put into oil for a day, which causes any previous little cracks to disappear, the stone becomes more fiery. The outward oil is afterward removed by rubbing with bran.

The previous insignificant-looking light grey veins will, in in proportion to this porosity, be found stained brownish grey or black; the white ones have turned purer, and their veins have become brighter in colour The chemical process which took place is very easy of solution; the honey penetrated into the pores and has become carbonised by sulphuric acid. White and many red streaks are apparently imperceptible, but the intensity of their colour is heightened.

The so-called Brazilian cornelian is also "cooked" as in the preceding manner. Great quantities of the crude stone are imported into Northern Italy, and those adapted to cameo cutting bring high prices, sometimes £400 per cwt. These cornelians contain an oxyhydrate of iron, and are generally entirely unimpregnable; the reddish tints are often deadened by being carbonised, and either are not visible, or appear as an admixture of the grey and black colours, hence they often play into brown.

Pliny, who simply speaks of the method from hearsay, mentions the treatment by honey alone, and omits the sulphuric acid, without which, as is clearly perceptible, no colourization can take place. But as his mention may be accepted as proof positive that the Romans understood the art of colouring, we may go a step further and accept that they were also acquainted with sulphuric acid and its action. No direct proof can be cited; but the acid is, as is well known, a product of volcanoes, and it is not difficult to imagine that they fully understood it, since they were very well acquainted with sulphur and the natural sulphurets. If they possessed no direct sulphuric acid, they at least were acquainted with solid and liquid substances which contained the free acid, and which answered their purposes.

In the already mentioned districts of Oberstein and Idar, the parties engaged in the art also understood how to produce a beautiful citron yellow. The following is the process: The stone is dried for several days upon a stove, which must not be too warm, however; it is next put into a clean pot, which is filled with commercial muriatic acid; a cover is cemented over it with clay, and the pot is left untouched for two or three weeks, remaining in a warm place. The chemical action is open to debate, whether the yellow colour is produced by a salt in the acid, which unites with some free element contained in the stone, or whether the colouring principle is contained in the acid itself, and is imbibed by the stone.

Among the gems cut by the Greeks and Romans, many specimens are found with blue veins. It is supposed that they were coloured artificially, but the secret has died with them. The cameo cutters of Idar use the following method for blue: The stone is placed into a solution of salt of oxide of iron, and afterwards saturated with a solution of prussiate of potash. The colour called Prussian blue is thus produced.

Or a solution of ferrous salt is made. The stone is placed at first into a solution of prussiate of potash, chloric gas is conducted upon it, whereby potassium ferrocyanide is produced, which, when the stone has been saturated in the solution of ferrous salt, produces Prussian blue, and colours the different bands. A third method is used, which gives an evanescent colour, by conducting a gaseous solution of prussic acid upon the stone saturated with a solution of chloride of iron. The method is dangerous as well, owing to the poisonous qualities of the acid.

The colour is agate; chalcedony and Brazilian cornelian may also be altered by exposing them to a gentle heat. The white chalcedony often becomes purer in colour, the red tints become more pronounced, and the dead yellow will change into a beautiful red, which is especially the case with the cornelian, whereby a veined stone is changed into a handsome cornelian, and a single coloured one receives its true cornelian lustre and fire. The following is the method:—The stone is placed for two or three weeks upon a hot stove, and its water thoroughly dried out, then it is put into a crucible and dampened, not saturated, with sulphuric acid. The cutter simply dips the stone into the acid, and places it into the crucible. This is well covered and placed in a strong fire until red hot; the fire is permitted to die down slowly, and the crucible is taken out only when thoroughly cold. The burning effects a thorough anhydration of the oxyhydrate of iron, which permits the colour to become more lustrous and to assume the peculiar cornelian tint. Small articles are burned before being cut; larger ones, such as dessert-plates, vessels, vases, etc., after cutting, for the reason that smaller articles are not liable to crack, larger ones will, however, and it is sought to reduce them as much as possible by cutting.

Watch and Clock Making at the Polytechnic.

[Opening Lecture by J. Herrman.]

Reasons for Our Mode of Practice.

A FEW hours will bring us to the end of another day, and the majority of living London will sink to rest, weary with cares of to-morrow as much as with work to-day. Time hastens quick enough, yet we are ever outrunning it, projecting to-day into to-morrow. Unable to lift the veil that separates the present from the future, men are ever seeking to cast their own future, forgetting that unknown forces may cross their path and wholly change their plans. By preparing to-day for opportunities that may be given us to-morrow; by learning to-day how to act under the greatest variety of circumstances to-morrow, whether to take up or put down, turn to the right or the left, say yes or no, we are best preparing for to-morrow. This is the only key to our future; and for this we are responsible, and responsible for all that may lie in the path we may choose to take. What terrible forces are shut up in those little words, "yes," "no"; yet how carelessly do men handle them, forgetting that the destiny of an eternity may hang on a "yes" or a "no."

"Yes" or "no" should ever be, as the well-considered verdict of a sober court of jurors, a judgment in harmony with the balance of evidence, and not the issue of fitful fancy or passion. It is this unthinking section of society that yields such rich harvests to the army of impostors—among which truth-outraging advertisements act like a magnet in steel shavings, vice swims and virtue sinks—that is the fruitful soil of credulity, which poisons confidence and puts faith to shame. Credulity is an obnoxious weed, growing side by side with confidence and faith, at which ignorance, dressed in the garb of rationalism, finds inexhaustive merriment in firing squibs, seeing not the immeasurable distance between them. Credulity is as the moth in a garment, the leak in a ship; but confidence the cement of society, the sister of truth. Without it life is a desert, and everywhere becomes like a machine that only works by brute force, without sentiment, affection, or love.

Conscious of the importance of this factor, I am anxious not to leave it out of my preparation for the future of this school. Though I cannot control its future, I am anxious to control the force that so greatly affects the future. For this object I have chosen my present theme, to supply you with evidence that will justify a reasonable conclusion, and, I hope, a satisfactory conclusion in relation to the object in view, gain the confidence of all who may stand in some relation to this school, and thus direct the forces that in so great a measure affect its future success.

Though more than one unknown quantity remain—which only time can determine—the ability, energy, and perseverance of students and of the teacher. In reference to the latter I may add one fact of promise. Time has proved beyond doubt the practical care of the promoter of the school for the welfare of all whose names are on the books of this Institution. That it will be to my interest to satisfy the expectation of Mr. Quintin Hogg you may take as a conclusion. But that satisfaction will be obtained by doing that which satisfies the best condition of the welfare and practical good of those entrusted to my care, and herein then lies the assurance that my interest lies along the same line on which yours is found. May your evidence and his be on my side when time gives its verdict.

My subject, which is therefore prospective rather than retrospective—what shall be, rather than what has been—may be subdivided and presented under the titles of—subjects and order of practice; method of, and appliances for working; theoretical instruction and its relationship to practice.

There are three leading principles which are subtending all mechanic operations, viz., the law of form, the method of forming material in harmony therewith, and the appliances by means of which it is accomplished; in other words, design, work, and tools.

According to this definition it would appear that my divisions are contrary to the order of things. Logically they are, but not in the order of fitness.

It appears so self-evident, on a little reflection, that knowledge must precede action, that it may be accepted as an axiom, without much fear of contradiction. It is true this statement is often challenged, but it is only a runaway knock, which we can readily see by a counter-supposition. That man who would act contrary to this statement, that is, would commence working without thought of what he wants to accomplish, without having the form projected before his mind's eye, or without design, would be like a man getting on a spirited horse and taking its tail for the reins. Everyone would think him crazy; hence it is a self-evident fact, which requires no demonstration.

"Why then," may it be asked, "have I taken it as a subdivision at all?" Because, not so much to show that design is necessary, but what is necessary for an efficient design, and for this reason I thought it most practical to treat of work and tools first, in order better to prepare for making the relationship to design or theoretical instruction more plain.

First then, subjects and order of practice.

We need to remember that practice is a compound of skill and experience. Experience is the harvest of work, which, in its turn, furnishes the fruitful seed of work, under the husbandman's "skill." Hence, I shall so seek to direct work and practice, that, in cultivating skill, students gather in the greatest possible harvest of experience. I know this looks like a departure from standing, or, what one may call classical customs, but I think I can give reasonable ground for this departure.

There can be little difference of opinion about the starting-point—it must commence with filing or turning; but that need not go on long before we connect something with it. Take now, for instance, such a simple thing as a tripod for polishing flat surfaces on a polishing block; a very indifferent skill in either of these can be enlisted, and with profit, for making such a plain tool. Thus, while the process of improvement flows on undiminished, we connect therewith instruction in modes of fitting and combining, minimise the tendency to monotony which kills the interest of beginners, and furnish at the same time, means for collecting experience. Indeed, this simple operation affords instruction in principles that some advanced workmen are unacquainted with.

It is a fact in geometry that in constant angles the arcs vary as the radii. Here, then, we have a guide for constructing this tool, for it shows that if we are polishing a surface on this tool, we must polish more off that part which lies further from the feet than that part nearest to it, and that the difference is in proportion to the difference of the distances of these parts from the feet; so we learn that it is desirable to make it as long as possible consistent with convenience in using it.

So on in every case; I would apply this plan of connecting practice with instruction, selecting subjects suitable to the degree of skill.

This, I think, is not only of advantage in one way, but in several, and also in a way that can only be put in practice at a school of this description.

In making a clock or watch, the degree of skill necessary varies considerably, it is progressive, yet it would hardly be possible for a youth commencing to learn his business to advance in practice so as to be able to commence and finish a clock, and if he did, it would approximate very much to the old mode of tuition, for he will have to handle one thing a great many times, and things repeat themselves often, thus his opportunity for observation and experience is limited and confined to one thing only. If, however, he is able to practise on parts of separate clocks, each one having its own connections and relationships, the opportunity for exercise of skill is not less, rather more, while at the same time his field of observation is increased, and opportunities for gathering experience multiplied.

According to my experience it is a mistake to put a youth to a piece of work that lasts him too long; seeing it, and working at it day after day he gets utterly sick of it, until he ceases to proceed with intelligence, and works merely like a machine, without interest and incentive, and thus the object is defeated by the means used to accomplish it. We may think that repetition will produce thoroughness, but this is far from holding good; it is possible to pass a lamp post every day for years and not know that it is there. I have known men who have had scores of English ¾-plate watches through their hands declare and offer heavy stakes, that the lever is always above the pallet. Seeing is not observing, but experience is inseparable from observation; therefore to give a youth experience, stimulate and enlarge his field of observation, and he will collect experience.

I have hinted about the special advantage of this school in this sense. It is evident that it would not be possible for any master of one or two, or even more apprentices, to adopt such a course if he desired to do so, because the time in which he could hope to complete clocks or watches thus commenced, would, and must necessarily be, remote. Here, however, we have a more happy state of conditions. We may expect considerably more contributors towards completion of the various parts of a watch or clock, indeed of a number of clocks, thus we may vary and enlarge the field of observation, and so not only have a larger field over which the practice extends, but in addition to this he has the opportunity of observing what others are doing in working on other parts. This brings me to another important point connected with this, that is the pecuniary part of this business.

So far as new work is concerned, no school can very well have a better opportunity of finding a market for its production than is afforded by the various agencies connected with the Institution, and no system could very well afford a better opportunity for turning the labour of students to the greatest possible market value, consistent with the primary purpose, that is progress in learning, because, suiting the work to the degree of progress, it follows that there must be far less spoiling and breaking than if work is demanded that is out of proportion to practice, and which has to be repeated till the practice is brought up to the standard necessary for a satisfactory termination. Conceive now that, instead of perfecting or improving practice by repeating the same thing and spoiling material, we can bring up this practice by suiting work to the degree of progress. We must have less material wasted, and better chance of utilising time, over and above the mere object of practice.

If you look at this suggestion more closely, you will see that it must also lay the best possible groundwork for a good jobber. The best watch jobber or repairer is he who has the largest amount of experience, knows best how to restore things to their original conditions, and can do it in the neatest and most workmanlike way.

Here a large field of practice is directly aimed at, and, as I have especially to show later on, students will have ample opportunity of gaining knowledge that will enable them to start from fundamental principles, so that the three principal conditions essential in a good jobber or repairer are provided for; and undoubtedly this will be the future occupation of the majority of students that may attend here. I will at once admit that I have not made, and do not intend to make, any special provision for the training of specialists—that is, for young men who wish to become escapement makers, finishers, or any other branch. For this my reasons are both negative and positive; first, because escapement-making and finishing, as it has been practised hitherto, is a thing of the past; if manufacturing of watches in England is to be maintained, the mode in reference to these sections will have to undergo a revolution. Let any one go to Clerkenwell, and inquire, and see what escapement makers and finishers are doing, and it will be evident to him that there is no need to put any specialists of this sort in the labour market. True it is, I admit, that there will—and, perhaps, in an increasing ratio—remain a demand for a limited number of best escapement makers and finishers; but such men are not finished in a school, they have to finish themselves. What a school can do I trust we shall, and I hope more than any other has as yet—at least I shall not be satisfied short of this.

In regard to the positive reason, my answer is this: All the principles of the lever escapement will be taught in the theoretical section; their mode of application will be taught practically, and in addition to this I feel confident to be able to introduce a few simple tools that will save labour and more systematise the process, so that there are no special provisions, simply because these provisions are included in the general course. Hence I feel confident of being able to provide all that a young man needs, without further instruction to complete the needful further training as a specialist.

Here I wish to refer to two objections which generally are urged. First is this: It is said that such a training as this in a certain sense unfits a young man for the present mode of jobbing, because if he does everything as it should be done he cannot make his work pay.

The dealers in these objections I would answer by a few questions, namely, if a jobber shows great proficiency with the chisel punch to knock a hole towards any of the four points of the compass, would that be the man you would entrust with a good watch of any description—or let your customer know you did? Or if any sort of waging of the balance, and clown-like evolution of the spring, come within his ideal of proper jobbing, would you entrust a watch to him with which you want to satisfy your customer? Even in the fullest and best sense in which such an objection has any value it must be remembered that bye-paths are used with best advantage by him who knows the locality best; that best disciplined troops are best suited to suppress disorder, and that that man is most likely to succeed best and quickest with a job who has fullest knowledge of what is required, knows how to do it, and, therefore, has most perfect command of the whole. Besides, I am certain there is no need of training botchers; not only is there no scarcity in the market of this kind of fish, but, like specialists, they generate themselves.

Clockmaking in the Black Forest.

(From Report of the Royal Commission on Technical Education.)

By means of lotteries and further grants, the Gewerbe-Halle was erected and opened in 1874, and the school was transferred to the new building, and was reconstituted and formally opened in June, 1877. The Government grant for this purpose was £650. The school is managed by a local council chosen from the surrounding districts, and consisting of eight persons. The annual budget is £360, of which sum the Province of Freiburg contributes £25, and Gillingen £50. The school is held in two small rooms, very ill-suited for the purpose, and a new building is in course of erection by the local Gewerbe-Verein (trade society) at a cost of from £1,250 to £1,500. There are at present eighteen pupils. Most of them are admitted free, and many are supported by exhibitions which are given by the neighbouring towns, and may amount to £20 per annum. The school fee is £1 per annum. The students must have been previously engaged for at least two years in practical clockmaking before they can be admitted. The course lasts one year. In the morning they have theoretical studies, consisting of geometry, arithmetic, algebra, physics, mechanics, technology of watch and clock making, geometrical drawing, projection, technical drawing, bookkeeping and commercial arithmetic; together with thirty hours' practical work per week in the shops in the afternoon. The lathes and tools seem excellent of their kind, but the accommodation was very cramped.

By far the most important manufacture of the Black Forest is that of small carved clocks, many of them with musical accompaniments, known as cuckoo-clocks. In Triberg and a group of small towns and villages surrounding it, known as the clock country, 13,500 people, the population of upwards of ninety parishes, are engaged in clockmaking. We went to Schoenach, a village in the hills above Triberg, where almost every cottage is the home of a clockmaker. The houses are large and substantially built. They are generally a considerable distance apart, and are surrounded with meadow-land and pastures. In addition to the home workers there are three or four small factories, in which the wheels and other parts of clocks (Uhrenbestendtheile) are made. In one of these, visited by us, there were about five or six workmen employed, and an apprentice. The power was derived from a small overshot wheel. There was a wire cutting and straightening machine for preparing the pinions, some fine drills, a tooth-cutting machine, a shaping machine for the wheel teeth, and a small press for driving on the bosses, etc. The machinery was ingenious and well adapted for its purpose. The rough castings made in the village were excellent. We were told that the men working piece-work in the factories could earn from two to three marks per diem, though a very small proportion of the working men can earn the latter sum. In a second factory we visited subsequently, the movements made here were being fitted together and made into clocks. Carpenters were making the rough framework to contain the wheels, and others were preparing the varnished outer cases. The clock passed from hand to hand, one man adding the winding barrel, another the train of wheels, a third the escapement, and another placing the works into the case. The clocks were being packed up for sale in another part of the works. They seemed all pretty much of one pattern, and of a very common description. The proprietor informed us that he had produced clocks of exactly the same kind as those that were made in the cottages. They went mainly to various parts of Europe. None now go to England or to America. The Americans not only supply themselves with cheap clocks, but they have driven out the Black Forest maker from the English market. The people employed at clockmaking live, we are told, very poorly—mainly on potatoes—though we saw soup and meat in some of the cottages. The cottages are very large; some of them contain as many as twelve families. Many of the people have only one or two rooms and a bit of land, probably about twenty perches, for which they pay from ten to fourteen marks rent per month. An old gentleman mowing in a very wet meadow was pointed out to us as the Burgermeister of Schoenach. We went into several of the cottages and saw the people at the work. The women were polishing the clock cases, and the men were making the wheel-work. We were told here that an industrious worker at home could earn as much as a good workman in a factory. The water-power is everywhere most ingeniously utilised, and the water itself is, as in many parts of England, employed for irrigation on the steep hillsides.

Magnetisation of Pocket Watches at the Electrical Exhibition.

In the earlier dynamos, considerable free magnetism existed in the vicinity of the polar extremities of the field magnets, showing a waste of energy due mainly to inefficient armatures. A fine watch brought into the vicinity of one of these machines was certain to become magnetised more or less; in many instances, valuable watches have been utterly ruined in this way. The evil became so great that several of our electric inventors undertook to devise apparatus for demagnetising watches.

The magnetised watch was placed in a holder, which revolved in every possible direction in horizontal and vertical planes before the face of a powerful electro-magnet. At the same time, it was gradually withdrawn from the electro-magnet until it was finally practically removed from its influence. However strong the magnetism of the watch when placed in the machine, when taken out of it no trace of magnetism could be found, and the watch, although it refused to go when placed in the machine, would generally be found running as usual when removed from it.

Another method, devised about the same time, for accomplishing the same result, consisted in placing the watch to be demagnetised in a large helix supplied with a rapidly alternating current of electricity, the current being very strong at first and then gradually diminished to nothing. This process was found to very effectually demagnetise a watch. In the more recent and more perfect dynamo-electric machines the magnetism is more completely confined within the machine itself, so that the watch, unless brought into very close proximity to the machine, would not be liable to become magnetised to a degree to injure its operation. But should the wearer of a very fine watch be so unfortunate as to injure it in this way, he may readily demagnetise it himself by means of the process last described.

Some of our prominent watchmakers, in view of the liability of watches to become injured from this cause, have devised watches which are incapable of being magnetised to an injurious degree, and may therefore be used with impunity by electricians and others who are necessarily brought into close proximity with powerful dynamo-electric machines.

What we have said on this subject has been evoked by a correspondent who intends visiting the Philadelphia Exhibition. As there is no end of electric clocks and systems of electric time transmission in the Exhibition, there will be no difficulty in ascertaining the exact time anywhere, and we advise our correspondent, if he has a valuable timepiece which might be affected by magnetism, to leave it in the hotel safe while he visits the Exhibition, if he desires to be absolutely certain that his watch will not be injured.—*Scientific American.*

Abstract of Principal Changes of the Rates of Chronometers on Trial

NAME OF MAKER.	No.	Whether 2 or 8 days.	ADDRESS OF MAKER.	Construction of Escapement and Balance, from the Description furnished by the Maker.	First Day of Rating.	L Da Rat
Brunner	3777	2	92, Smallbrook Street, Birmingham	Airy's compensation arm	Jan. 12	Jul
C. Frodsham & Co.	0003	2	84, Strand, W.C.	Charles Frodsham's three-bar compensation balance	Jan. 12	Jul
Penlington	2211	2	2 & 3, St. George's Crescent, Liverpool	Auxiliary compensation. Palladium spring	Jan. 12	Jul
Isaac	1669	2	10, Spencer Street, Clerkenwell, E.C.	Auxiliary construction acting upon jewels	Jan. 12	Jul
Birchall	1382	2	12a, Stonefield Street, Islington, N.	Ordinary balance with slight alterations	Jan. 12	Jul
Williams	3690	2	3, Bute Docks, Cardiff	Ordinary balance with auxiliary compensation	Jan. 12	Jul
Moore	5756	2	102, High Street, Belfast	Auxiliary to balance. Airy's compensation arm	Jan. 12	Jul
Shepherd	1832	2	14, Talbot Court, London, E.C.	Auxiliary to balance	Jan. 12	Jul
James Poole & Co.	5713	2	33, Spencer Street, Clerkenwell, E.C.	Poole's auxiliary	Jan. 12	Jul
Reid & Sons	5781	2	41, Grey Street, Newcastle-on-Tyne	Auxiliary compensation. Palladium spring	Jan. 12	Jul
Heap	6480	2	124, New North Road, London	Auxiliary for cold. Airy's compensation arm	Jan. 12	Jul
Nelson	2876	2	453, New Cross Road, S.E.	Ordinary escapement. Auxiliary gaining in cold	Jan. 12	Jul
Penlington	2210	2	2 & 3, St. George's Crescent, Liverpool	Auxiliary compensation. Palladium spring	Jan. 12	Jul
Isaac	1670	2	10, Spencer Street, Clerkenwell, E.C.	Ordinary balance without auxiliary	Jan. 12	Jul
McInnes	5791	2	24, Grainger St. West, Newcastle-on-Tyne	Double auxiliary to balance	Jan. 12	Jul
Lawson	2358	8	241, Liverpool Bldgs., Liverpool Road, N.	Auxiliary acting in heat and cold	Jan. 12	Jul
Kullberg	4146	2	105, Liverpool Road, N.	Reversed detent with short spring	Jan. 12	Jul
Sewill	4425	2	61, South Castle Street, Liverpool	Auxiliary compensation	Jan. 12	Jul
Shepherd	1834	2	14, Talbot Court, London, E.C.	Auxiliary to balance	Jan. 12	Jul
Keys	450	2	15, Craven Street, Strand, W.C.	Auxiliary compensation	Jan. 12	Jul
Reid & Sons	5785	2	41, Grey Street, Newcastle-on-Tyne	Auxiliary compensation. Palladium spring	Jan. 12	Jul
Pyott	818	2	74, West India Dock Road, E.	Auxiliary compensation	Jan. 12	Jul
Nelson	2901	2	453, New Cross Road, S.E.	Ordinary escapement. Double auxiliary	Jan. 12	Jul
Webster	731	2	35, Herrick Road, Highbury, N.	Ordinary balance. Palladium spring	Jan. 12	Jul
Hennessy	3874	2	5, Wind Street, Swansea	Auxiliary compensation to balance	Jan. 12	Jul
James Poole & Co.	5796	2	33, Spencer Street, Clerkenwell, E.C.	Poole's auxiliary]	Jan. 12	Jul
Oram & Son	19181	2	19, Wilmington Square, W.C.	Ordinary balance	Jan. 12	Jul
Schoof	6044	2	99, St. John Street Road, E.C.	Schoof's improved resilient lever escapement	Jan. 12	Jul
Hennessy	3784	2	5, Wind Street, Swansea	Auxiliary compensation to balance	Jan. 12	Jul
Keys	880	2	15, Craven Street, Strand, W.C.	Auxiliary to balance	Jan. 12	Jul
Schoof	6050	2	99, St. John Street Road, E.C.	Schoof's improved resilient lever escapement	Jan. 12	Jul
Oram & Son	18750	2	19, Wilmington Square, W.C.	Auxiliary compensation	Jan. 12	Jul
Kullberg	4075	2	105, Liverpool Road, N.	Reversed detent with short spring	Jan. 12	Mar
Edward & Sons	3688	2	1, Poultry, E.C.	Improved ordinary balance	Jan. 12	Jul

The sign + indi

† During these weeks the Chronometers were placed in the chamber of a stove heated by jets of gas. The gas flames are exterior to the chamber, i
the date, indicate respectively exposure to heat in the

The Chronometers are placed in order of merit, their respective positions bei

Kullberg, 4075.—This Chronometer was withdrawn

Edward & Sons, 3688.—The main spring of this Chronometer was found b

chase by the Admiralty, at the Royal Observatory, Greenwich, 1884.

ABSTRACT OF THE PRINCIPAL CHANGES OF RATE.								
Least Weekly Sum.	In what Week.	Greatest Weekly Sum.	In what Week.	Difference between the Greatest and Least.	Greatest Difference between one Week and the next.	Before and after what Day.	NAME or MAKER.	No.
s.		s.		s.	s.			
− 4 · 0	March 15 to 22†	+ 4 · 0	February 16 to 23	8 · 0	3 · 2	March 1†	Brunner	3777
−24 · 4	May 24 to 31†	−16 · 5	March 8 to 15†	7 · 9	4 · 8	†March 29	C. Frodsham & Co.	0003
−12 · 8	June 14 to 21	− 0 · 2	April 19 to 26	12 · 6	4 · 1	{ April 19 May 10 }	Penlington ..	2211
+ 0 · 2	Jan. 26 to Feb. 2	+12 · 1	April 12 to 19	11 · 9	5 · 3	†June 14	Isaac	1669
− 1 · 5	March 22 to 29†	+ 8 · 7	July 19 to 26	10 · 2	6 · 7	March 1†	Birchall	1382
−20 · 9	April 19 to 26	− 8 · 4	March 15 to 22†	12 · 5	7 · 4	†March 29	Williams	3690
+ 4 · 6	January 12 to 19	+15 · 8	May 31 to June 7†	11 · 2	8 · 4	†June 14	Moore	5756
− 2 · 6	March 15 to 22†	+11 · 4	June 28 to July 5	14 · 0	7 · 2	†March 22†	Shepherd	1832
−18 · 0	April 12 to 19	− 4 · 6	July 5 to 12	13 · 4	7 · 8	†March 29	James Poole & Co.	5713
− 2 · 9	February 2 to 9	+13 · 2	June 7 to 14†	16 · 1	6 · 6	March 1†	Reid and Sons ..	5781
+ 5 · 4	Jan. 26 to Feb. 2	+26 · 5	July 19 to 26	21 · 1	6 · 9	†March 29	Heap	6480
+ 9 · 6	January 12 to 19	+28 · 8	April 19 to 26	19 · 2	7 · 9	May 10	Nelson	2876
−29 · 7	March 1 to 8†	− 5 · 8	June 21 to 28	23 · 9	6 · 7	†March 22†	Penlington ..	2210
−20 · 4	May 10 to 17	− 5 · 5	March 8 to 15†	14 · 9	11 · 4	†March 29	Isaac	1670
−21 · 5	March 15 to 22†	+ 4 · 3	July 5 to 12	25 · 8	6 · 1	Feb. 2	McInnes	5791
+10 · 6	March 1 to 8†	+31 · 7	July 12 to 19	21 · 1	8 · 5	†March 29	Lawson	2358
− 4 · 0	July 19 to 26	+13 · 2	June 14 to 21	17 · 2	10 · 6	June 28	Kullberg	4146
−13 · 9	February 12 to 19	+10 · 9	June 7 to 14†	24 · 8	8 · 5	May 17†	Sewill	4425
−27 · 6	March 15 to 22†	− 0 · 6	June 28 to July 5	27 · 0	8 · 4	†March 22†	Shepherd	1834
+18 · 0	January 12 to 19	+37 · 4	July 5 to 12	19 · 4	12 · 5	†March 29	Keys	450
−16 · 7	January 12 to 19	+ 8 · 6	July 5 to 12	25 · 3	10 · 1	May 17†	Reid and Sons ..	5785
+ 3 · 7	January 12 to 19	+34 · 9	July 12 to 19	31 · 2	8 · 1	April 5	Pyott	818
−13 · 8	July 5 to 12	+ 8 · 9	May 17 to 24†	22 · 7	12 · 4	May 17†	Nelson	2901
− 4 · 7	January 12 to 19	+27 · 3	July 19 to 26	32 · 0	10 · 4	†March 29	Webster	731
−18 · 9	March 15 to 22†	+ 7 · 3	July 19 to 26	26 · 2	13 · 4	May 17†	Hennessy	3874
− 9 · 6	Feb. 23 to March 1	+16 · 0	May 31 to June 7†	25 · 6	13 · 7	March 1†	James Poole & Co.	5796
−12 · 2	Jan. 26 to Feb. 2	+19 · 5	March 22 to 29†	31 · 7	12 · 3	March 1†	Oram and Son ..	19181
−17 · 8	March 8 to 15†	+13 · 3	July 19 to 26	31 · 1	14 · 0	†June 14	Schoof	6044
−20 · 8	June 14 to 21	+ 7 · 1	March 15 to 22†	27 · 9	18 · 8	May 17†	Hennessy	3784
+ 0 · 8	July 19 to 26	+32 · 5	April 19 to 26	31 · 7	16 · 9	July 12	Keys	880
−20 · 5	February 16 to 23	+19 · 5	June 28 to July 5	40 · 0	15 · 3	†March 29	Schoof	6050
− 3 · 4	April 19 to 26	+32 · 9	March 22 to 29†	36 · 3	25 · 5	March 1†	Oram and Son ..	18750
− 5 · 4	March 1 to 8†	+13 · 1	March 22 to 29†	18 · 5	10 · 2	†March 15†	Kullberg	4075
+12 · 4	March 15 to 22†	+34 · 2	April 19 to 26	21 · 8	13 · 7	†March 29	Edward and Sons..	3688

e rate is gaining.

nc of the injurious products of combustion can enter. In the column "Before and after what day," the positions of the symbol (†), before or after ately preceding, or in the week immediately following.

d by consideration of the irregularities of rate exhibited in the Table above.

by permission of the Astronomer Royal on April 3.

twenty-sixth week of the trial. It was removed by the maker on July 14.

Abstract of Principal Changes of the Rates of Chronometers on Trial for Purchase by the Admiralty, at the Royal Observatory, Greenwich, 1884.

NAME OF MAKER.	No.	Whether 2 or 8 days.	ADDRESS OF MAKER.	Construction of Escapement and Balance, from the Description furnished by the Maker.	ABSTRACT OF THE PRINCIPAL CHANGES OF RATE.										NAME OF MAKER.	No.
					First Day of Rating.	Last Day of Rating.	Number of Weeks.	Least Weekly Sum. s.	In what Week.	Greatest Weekly Sum. s.	In what Week.	Difference between the Greatest and Least. s.	Greatest Difference between one Week and the next. s.	Before and after what Day.		
Brunner	3777	2	92, Smallbrook Street, Birmingham	Airy's compensation arm	Jan. 12	July 26	28	− 4·0	March 15 to 22†	+ 4·0	February 16 to 23	8·0	3·2	March 1†	Brunner	3777
C. Frodsham & Co.	0003	2	84, Strand, W.C.	Charles Frodsham's three-bar compensation balance	Jan. 12	July 26	28	−24·4	May 24 to 31†	−16·5	March 8 to 15†	7·9	4·8	†March 29	C. Frodsham & Co.	0003
Penlington	2211	2	2 & 3, St. George's Crescent, Liverpool	Auxiliary compensation. Palladium spring	Jan. 12	July 26	28	−12·8	June 14 to 21	− 0·2	April 19 to 26	12·6	4·1	April 19 May 10	Penlington	2211
Isaac	1669	2	10, Spencer Street, Clerkenwell, E.C.	Auxiliary construction acting upon jewels	Jan. 12	July 26	28	+ 0·2	Jan. 26 to Feb. 2	+12·1	April 12 to 19	11·9	5·3	†June 14	Isaac	1669
Birchall	1382	2	12a, Stonefield Street, Islington, N.	Ordinary balance with slight alterations	Jan. 12	July 26	28	− 1·5	March 22 to 29†	+ 8·7	July 19 to 26	10·2	6·7	March 1†	Birchall	1382
Williams	3690	2	3, Bute Docks, Cardiff	Ordinary balance with auxiliary compensation	Jan. 12	July 26	28	−20·9	April 19 to 26	− 8·4	March 15 to 22†	12·5	7·4	†March 29	Williams	3690
Moore	5756	2	102, High Street, Belfast	Auxiliary to balance. Airy's compensation arm	Jan. 12	July 26	28	+ 4·6	January 12 to 19	+15·8	May 31 to June 7†	11·2	8·4	†June 14	Moore	5756
Shepherd	1832	2	14, Talbot Court, London, E.C.	Auxiliary to balance	Jan. 12	July 26	28	− 2·6	March 15 to 22†	+11·4	June 28 to July 5	14·0	7·2	†March 22†	Shepherd	1832
James Poole & Co.	5713	2	33, Spencer Street, Clerkenwell, E.C.	Poole's auxiliary	Jan. 12	July 26	28	−18·0	April 12 to 19	− 4·6	July 5 to 12	13·4	7·8	†March 29	James Poole & Co.	5713
Reid & Sons	5781	2	41, Grey Street, Newcastle-on-Tyne	Auxiliary compensation. Palladium spring	Jan. 12	July 26	28	− 2·9	February 2 to 9	+13·2	June 7 to 14†	16·1	6·6	March 1†	Reid and Sons	5781
Heap	6480	2	124, New North Road, London	Auxiliary for cold. Airy's compensation arm	Jan. 12	July 26	28	+ 5·4	Jan. 26 to Feb. 2	+26·5	July 19 to 26	21·1	6·9	†March 29	Heap	6480
Nelson	2876	2	453, New Cross Road, S.E.	Ordinary escapement. Auxiliary gaining in cold	Jan. 12	July 26	28	+ 9·6	January 12 to 19	+28·8	April 19 to 26	19·2	7·9	May 10	Nelson	2876
Penlington	2210	2	2 & 3, St. George's Crescent, Liverpool	Auxiliary compensation. Palladium spring	Jan. 12	July 26	28	−29·7	March 1 to 8†	− 5·8	June 21 to 28	23·9	6·7	†March 22†	Penlington	2210
Isaac	1670	2	10, Spencer Street, Clerkenwell, E.C.	Ordinary balance without auxiliary	Jan. 12	July 26	28	−20·4	May 10 to 17	− 5·5	March 8 to 15†	14·9	11·4	†March 29	Isaac	1670
McInnes	5791	2	24, Grainger St. West, Newcastle-on-Tyne	Double auxiliary to balance	Jan. 12	July 26	28	−21·5	March 15 to 22†	+ 4·3	July 5 to 12	25·8	6·1	Feb. 2	McInnes	5791
Lawson	2358	8	241, Liverpool Bldgs., Liverpool Road, N.	Auxiliary acting in heat and cold	Jan. 12	July 26	28	+10·6	March 1 to 8†	+31·7	July 12 to 19	21·1	8·5	†March 29	Lawson	2358
Kullberg	4146	2	105, Liverpool Road, N.	Reversed detent with short spring	Jan. 12	July 26	28	− 4·0	July 19 to 26	+13·2	June 14 to 21	17·2	10·6	June 28	Kullberg	4146
Sewill	4425	2	61, South Castle Street, Liverpool	Auxiliary compensation	Jan. 12	July 26	28	−13·9	February 12 to 19	+10·9	June 7 to 14†	24·8	8·5	May 17†	Sewill	4425
Shepherd	1834	2	14, Talbot Court, London, E.C.	Auxiliary to balance	Jan. 12	July 26	28	−27·6	March 15 to 22†	− 0·6	June 28 to July 5	27·0	8·4	†March 22†	Shepherd	1834
Keys	450	2	15, Craven Street, Strand, W.C.	Auxiliary compensation	Jan. 12	July 26	28	+18·0	January 12 to 19	+37·4	July 5 to 12	19·4	12·5	†March 29	Keys	450
Reid & Sons	5785	2	41, Grey Street, Newcastle-on-Tyne	Auxiliary compensation. Palladium spring	Jan. 12	July 26	28	−16·7	January 12 to 19	+ 8·6	July 5 to 12	25·3	10·1	May 17†	Reid and Sons	5785
Pyott	818	2	74, West India Dock Road, E.	Auxiliary compensation	Jan. 12	July 26	28	+ 3·7	January 12 to 19	+34·9	July 12 to 19	31·2	8·1	April 5	Pyott	818
Nelson	2901	2	453, New Cross Road, S.E.	Ordinary escapement. Double auxiliary	Jan. 12	July 26	28	−13·8	July 5 to 12	+ 8·9	May 17 to 24†	22·7	12·4	May 17†	Nelson	2901
Webster	731	2	35, Herrick Road, Highbury, N.	Ordinary balance. Palladium spring	Jan. 12	July 26	28	− 4·7	January 12 to 19	+27·3	July 19 to 26	32·0	10·4	†March 29	Webster	731
Hennessy	3874	2	5, Wind Street, Swansea	Auxiliary compensation to balance	Jan. 12	July 26	28	−18·9	March 15 to 22†	+ 7·3	July 19 to 26	26·2	13·4	May 17†	Hennessy	3874
James Poole & Co.	5796	2	33, Spencer Street, Clerkenwell, E.C.	Poole's auxiliary]	Jan. 12	July 26	28	− 9·6	Feb. 23 to March 1	+16·0	May 31 to June 7†	25·6	13·7	March 1†	James Poole & Co.	5796
Oram & Son	19181	2	19, Wilmington Square, W.C.	Ordinary balance	Jan. 12	July 26	28	−12·2	Jan. 26 to Feb. 2	+19·5	March 22 to 29†	31·7	12·3	March 1†	Oram and Son	19181
Schoof	6044	2	99, St. John Street Road, E.C.	Schoof's improved resilient lever escapement	Jan. 12	July 26	28	−17·8	March 8 to 15†	+13·3	July 19 to 26	31·1	14·0	†June 14	Schoof	6044
Hennessy	3784	2	5, Wind Street, Swansea	Auxiliary compensation to balance	Jan. 12	July 26	28	−20·8	June 14 to 21	+ 7·1	March 15 to 22†	27·9	18·8	May 17†	Hennessy	3784
Keys	880	2	15, Craven Street, Strand, W.C.	Auxiliary to balance	Jan. 12	July 26	28	+ 0·8	July 19 to 26	+32·5	April 19 to 26	31·7	10·9	July 12	Keys	880
Schoof	6050	2	99, St. John Street Road, E.C.	Schoof's improved resilient lever escapement	Jan. 12	July 26	28	−20·5	February 16 to 23	+19·5	June 28 to July 5	40·0	16·3	†March 29	Schoof	6050
Oram & Son	18750	2	19, Wilmington Square, W.C.	Auxiliary compensation	Jan. 12	July 26	28	− 3·4	April 19 to 26	+32·9	March 22 to 29†	36·3	25·5	March 1†	Oram and Son	18750
Kullberg	4075	2	105, Liverpool Road, N.	Reversed detent with short spring	Jan. 12	Mar. 29	11	− 5·4	March 1 to 8†	+13·1	March 22 to 29†	18·5	10·2	†March 15†	Kullberg	4075
Edward & Sons	3688	2	1, Poultry, E.C.	Improved ordinary balance	Jan. 12	July 5	25	+12·4	March 15 to 22†	+34·2	April 19 to 26	21·8	13·7	†March 29	Edward and Sons	3688

The sign + indicates that the rate is gaining.

† During these weeks the Chronometers were placed in the chamber of a stove heated by jets of gas. The gas flames are exterior to the chamber, into which none of the injurious products of combustion can enter. In the column "Before and after what day," the positions of the symbol (†), before or after the date, indicate respectively exposure to heat in the week immediately preceding, or in the week immediately following.

The Chronometers are placed in order of merit, their respective positions being determined by consideration of the irregularities of rate exhibited in the Table above.

Kullberg, 4075.—This Chronometer was withdrawn by the maker by permission of the Astronomer Royal on April 3.

Edward & Sons, 3688.—The main spring of this Chronometer was found broken in the twenty-sixth week of the trial. It was removed by the maker on July 14.

The Causes of the Decline of the English Watch and Clock Trades.

(Abstract of a paper read before the Balloon Society of Great Britain, May 23rd, 1884, by Richard Whittaker; E. J. Watherston, Esq., presiding. Mr. Henry Ganney also read a paper the same evening.)

"Watchmaking at Home and Abroad" is a subject that has recently been brought before the notice of the Balloon Society by Mr. James U. Poole, and its consideration produced a very painful impression upon the audience, and left the whole matter in a state far from creditable to us as a trade.

It is not my purpose to-night to add one word to the melancholy picture that has already been presented to you, for if I was disposed to do this, I hardly think it would be possible. Nor do I intend to weary you with a multitude of statistics, showing the reality and extent of the decline; with these you have doubtless long been painfully familiar. Perhaps we might with profit refer to some of the places where this industry has been carried on, and which were once the active scenes of a busy, profitable, and great national industry, where the merchant and mechanic met for earnest business, and their products were to be seen throughout the commercial world. These places are now deserted, their noise has ceased, their lights are put out. No apprentices are taken, and only a few old men are left to execute a few straggling orders, which constitute the present English watch trade.

My object to-night is to inquire into the causes that have led to this decay, and to suggest such remedies as are calculated to restore this industry to its former prosperity.

One of the principal causes that has led to the decay of the chronometer, watch, and clock trades, in this country, is the neglect of machine tools.

At the very outset, does it not appear strange that the men who make such instruments should be open to a charge of this kind? One would have thought that the marvellously accurate results of a watch would have led them to secure such advantages. Some of these men have made the greatest and grandest marches that were ever made in mechanical science, and is it not surpassing strange that these men should fall asleep on the laurels they have won and remain so long in a comatose state? Strange as it may appear, it is nevertheless quite true, and this fact alone is well worth your serious consideration.

The history of machine tools, together with the revolution they have produced in horological art, has yet to be written, and while there are many bright pages in this history, there is at least one that is not creditable to us. I refer to the attempt that was made, in the year 1842, to establish a large watch and clock factory in Soho, London, in which some very fine machinery was used in the manufacture of watches and clocks. Among those connected with this enterprise I may mention the names of Thomas Earnshaw, John Barwise, and Thomas Hewitt. Not only were the most competent of English watchmakers connected with the enterprise, but it attracted the attention of public men also; among those who personally inspected the factory, and very carefully and minutely examined the machines and the work they produced, I may mention the names of William Ewart Gladstone, the present Prime Minister, Justice Bramwell, and Sir Edmund Beckett Dennison, afterwards Speaker. These gentlemen supported the Bill in the House of Commons, which at that time was necessary in the establishment of a public company.

Notwithstanding the testimony of men so competent to advise in such matters, the company met with the most violent opposition. The manufacturers and workmen of Clerkenwell rose up against it as one man. They imagined that it would soon ruin their trade, and they resorted to all measures within their reach to destroy it. The workmen engaged in the factory were attacked by the workmen of Clerkenwell, their windows were broken, and great injury and cruelty inflicted.

I will not enlarge upon this conduct, for however reprehensible it may be, there is reason to believe it was done at the instigation of those by whom they were employed, who certainly showed great activity in the affair. The principal watchmakers in the City looked with contempt on the new enterprise, as the following letter from the *Morning Herald*, dated October 29th, 1842, will show:—

"Sir,—Observing that it is stated in an article which has been going the round of the daily papers, and headed "Restoration of the Manufacture of Watches to Great Britain," that the inventor of certain machines for the production of watch movements in large quantities has submitted his machines to the inspection of the most experienced makers of chronometers and watches in London, not one has expressed a doubt that the work so produced being *incomparably superior* to that done in the usual way; and finding, moreover, that the said statement has produced an erroneous impression on the public mind, *we* the undersigned beg to state that *we* are not the parties alluded to in the paragraph in question, but that several of us have been applied to to become directors of the said company and have declined.

"We are, Sir, your obedient Servants,
"Parkinson and Frodsham, Change Alley.
"Barraud and Lunds, 41, Cornhill.
"McCabe and Co., 32, Cornhill.
"James Murray, 30, Cornhill.
"Brockbank, Atkins and Son, Cowper's Court, Cornhill.
"Clement Harris, 76, Cornhill.
"John Carter, 61, Cornhill.
"Hunter and Edwards, 43, Cornhill.
"Dated October 29th, 1842."

Such was the puff oblique that settled the Soho factory, but it did not destroy the art of watchmaking by machinery; on the contrary, it established it, and if in the plenitude of our power we have failed in the attempt to exterminate machine tools, I think it would be well for us to discontinue the opposition now. We need not pursue the inquiry; we have lived to see which were the true and which were the false prophets. Retribution came speedily; nine years later brought the Exhibition of 1851, the trade in watches increased enormously, and though the workmen worked day and night with their miserable duds—tools I cannot call them—yet they were powerless to execute the orders that flowed in from all quarters of the world. The trade was lost, or to speak more correctly, it gradually declined for the want of powerful machinery and proper organisation.

The advantages of machine tools are these, they produce an enormous amount of uniform work of the highest possible order at a nominal cost.

A machine tool operated by a girl will frequently produce more work than twenty men using ordinary hand tools. A watch made by machine tools on a uniform system is not only cheaper in the first instance, but it is much more easily repaired. Machine tools are a necessity of our times. The world's wants cannot be supplied without them. They produce not only necessities, but even make comforts and luxuries accessible to the millions of the poor which otherwise could only have been within the reach of the wealthy few.

The English watchmaker is never weary of telling you of the great achievements of his marine chronometer. He seems to live as near as possible to the First Lord of the Admiralty. The Swiss, and especially the American watchmakers make their machine tools to bear upon the wants of the great masses of the working population. It is to America, not England, that the world is indebted for a cheap house clock. We are too apt to forget that the poor man who to-day has bought a cheap watch, in order that he may economise time and be punctual in his engagements, is on the high road to become rich, and is likely soon to be the purchaser of an expensive watch. Precisely so, says the English watchmaker. Let the Swiss and Americans make the cheap work and we will make the best; but a third party has to be consulted; the man who is satisfied with the cheap-going barrel key watch of Switzerland or America, generally goes there for a high-class adjusted keyless watch.

Of this we may rest assured, that for all the mechanical skill that the world can produce, there is room. There is a bench for every man in the world's great workshop; we are not going to lament over the fact that a large watch factory is in existence at Waltham; no, gentlemen, for with your help we shall be able to surpass them. When Alexander the Great had conquered what in his time was called the Eastern World, it is said the General wept for the want of more worlds to conquer. Gentlemen, we need not weep, like Alexander.

Truly, we must congratulate the advocates of hand labour upon their success in Clerkenwell. They have succeeded in prohibiting even the semblance of better methods. Their school for technical training at the Horological Institute cannot boast of a single machine or tool of recent date. The appliances that the young men are taught to use are made from models that have been in use for more than a century. When I expostulate with them as to the unreasonableness of this course, they tell me it is the conservative policy of the trade. Mr. Chairman, to neglect the advantages of applied science, and to stand in the way of progress; this is not conservative policy, it is tomfoolery. I may here mention that the teacher of the escapement-making class at the Horological Institute recently called upon me to state that the wheel-cutting engine which was made for the use of the students, was so imperfect in its construction that it has been allowed to remain unused, *that it is covered with rust, and laid by in a cupboard.*

Another cause which has contributed to the decline of the English watch trade is the law which relates to Hall-marking, or perhaps it would be more correct to say these laws have seriously prevented the development of the trade. You are aware that in this country we are not allowed to make a gold or silver watch-case without having it Hall-marked; any man doing so is liable to a penalty of £50. The process is this, when a watch-case is made, it is sent to the Goldsmiths' Hall in a rough or incomplete state. A portion of metal is scraped from all parts of the case; it is then with the greatest of care refined, and when it has been ascertained that the metal is up to the required standard it is then Hall-marked. The average cost at the Hall for marking a silver case is 6d., and a gold case, about 1s. 6d.; and there can be no doubt that this system is a great protection against fraud, and is well worth all it costs to the purchaser. But it has some serious drawbacks. It does not apply to extremely light and inexpensive cases. Nor does it permit the dome or middle part of the case being made of a cheaper metal. The result is that the whole of the medium and low class trade, and it is very great, has, chiefly by means of the laws relating to Hall-marking, been thrown into the hands of Continental manufacturers. We allow foreigners to import into this country gold and silver watch-cases without any Hall-mark whatever. *All that we ask is that Hall-marking may be* OPTIONAL for Englishmen as it is for foreigners. Surely we have a right to claim for ourselves the privileges we have long granted to our opponents. Not only do we allow them to send cases without any guarantee of the quality of the metal, but, what is worse, we allow them to send to this country watch-cases that are made abroad, and then they are sent to London to be Hall-marked.

Hall-marking has been in use in this country for nearly 600 years, and by long usage, together with the tyranny of custom, it has become a kind of trade mark. Any watch-case bearing the London Hall-mark is regarded by the great masses of the people as London manufacture, seeing it can only be marked here; they not unnaturally conclude that it has been made in this country. The term English Hall-marked cases means to them cases made in England, bearing the well-known Hall-mark, and so pass muster as English work. This is free trade with a vengeance.

Unfortunately in English watchmaking we discourage improvements in our trade. What, do you mean to say that in this enlightened London of ours we are capable of anything of the kind? Such a statement seems to be monstrous in the extreme. Stop a minute, and I will read you a short extract from a speech by Mr. David Glasgow, one of the vice-presidents of the British Horological Institute, at their half-yearly meeting. It is as follows:—"It was often said out of doors that the Institute was slow to render assistance and encouragement to inventions and improvements connected with the trade. He had heard this expressed in reference particularly to a gentleman who had introduced a new going-barrel, keyless work, and improvements to the movement generally. If they identified themselves with a particular invention, which for the moment appeared advantageous, something more promising would probably turn up and they would have ingloriously to retrace their steps."

Now, Mr. Chairman, this statement fairly represents the policy of the Horological Institute, which has ruled English horology for more than a quarter of a century, and I contend that it is diametrically opposed to the best interest of the trade. No doubt if they encouraged one invention it would give an impetus to other inventors, who would bring from the rich mines of art and science improvements that would speedily surpass their predecessors; but these would not be "inglorious steps." On the contrary, they would be steps all glorious; and the sooner such steps are taken the better for all parties. Mild rebukes will never correct abuses of this kind, but I shall abstain from using the strong language necessary in such a case, because next year we are to have in London an international exhibition of inventions and improvements of every description, and this fact is in itself a national rebuke to such absurd notions. The present compensation balance in extremes of temperature is hardly worthy of the name. The keyless mechanisms in use, especially the mechanism for setting the hands, are all mechanically imperfect. The popular lever escapement, when it is correctly made, is so liable to banking error, that it is a misnomer to call it a portable machine. Remove one or all of these defects, and you will soon alter the aspect of English watchmaking. On the other hand, let it not be understood that I wish to neglect our good English custom of moving slowly and testing the security of each step before we take another, for this is the only way to avoid disastrous experiment. English watchmaking is at a standstill. It is languishing for the want of a new idea that will impart to it the vigour, and freshness, and bloom of youth. No greater boon could be conferred on our trade than some substantial improvement in keyless work and the going-barrel movement generally. It is the watch for which there is an enormous demand. While Clerkenwell manufacturers have been trying to force upon the market a thick, complicated, and costly fuzee key watch, they have not considered the requirements of the times. The great want of the English watch trade is a neat three-quarter plate, keyless, going-barrel lever watch, fully adjusted to heat and cold, to the long and short arcs of vibration, and timed in at least four positions. It is less difficult now to make such a watch that will not vary on its rate more than a minute per month than it was at the commencement of this century to make a verge watch to go to a minute a day, so perfectly is the theory of watchmaking understood. The labours of Michael Faraday and Wheatstone will shortly enable the Postmaster-General to give you sixpenny telegrams, and if we are to be as successful watchmakers in the future as we have been in the past, we must place the chronometric exactness of our forefathers in the most acceptable form within the reach of the great masses of the people.

Watch manufacturing, properly so called, is a great undertaking. It has long ceased to be a private or single-handed enterprise. If the two trades, watch and clock-making, were combined in one factory, it would require a company with a capital of at least £5,000,000.

It is a remarkable fact that, whereas, during the past fifty years, most industries in this country have made great progress, and at the present time possess more than usual signs of vitality, the watch and clock trades have, during the same period, shown unmistakeable signs of decay; and while we may express surprise that this decline in our trade has been going on so long without receiving the attention and investigation that it deserves, we feel sure that it will commend itself to your earnest study and support. When an industry in which we have long been *par excellence*, and which has contributed so much to the commercial superiority of the country, when this begins to fail from reasons which are beyond the power of those engaged in it to arrive at, it then becomes the duty of the Government to institute a committee of inquiry to find out the causes which have led to this decay, and to suggest such remedies as will tend to its resuscitation and former prosperity, and from this point of view it is not only a trade, but also a national question.

The Goldsmiths' Exhibition at Buda-Pest.

The great exhibition of goldsmiths' work at Buda-Pest is an immense success. It is thronged from morning till night, and hosts of foreign artists and connoisseurs arrive every day from different parts of the world to admire the artistic treasures exhibited at the National Museum. Next to Mr. Tréfort, Minister of Public Instruction, this success is due to Mr. Francis Pulszky, director of the National Museum, and to his son, Mr. Charles Pulszky. Both father and son have done very much towards the accomplishment and tasteful arrangement of the exhibition. One feels as if transported into fairyland on entering the picture-gallery of the Museum. It is a most dazzling sight, especially in the evening, in the silvery light of the electric lamps, which enhance the splendour of the precious heirlooms and increase the magic effect of the fantastic forms of embossed silver and gold, the delicate filagrees, brilliant enamelling, and costly gems which fill five large rooms of the gallery. It would lead us too far to enter into a detailed description of this marvellous exhibition, but we will try to give at least an approximate idea of its historic and artistic value.

At the French Exhibition of 1878 connoisseurs admired the Hungarian collection of prehistoric objects of gold and silver. Ancient Pannonia was famous for its precious mines, and the immense riches heaped up by the Gothic hordes which became its masters after the invasion of the Romans; and it received a large sum from the Emperor at Constantinople for preserving his frontiers from the barbarians. This is the origin of the treasures contained in the first room of the exhibition.

To the public at large the simple and primitive exhibits of this room seem of little value; but whoever takes an interest in history and archæology will be delighted by this collection, which takes us back into the period of the grand and bloody feuds during the migration of nations.

Most interesting are the many golden bracelets of primitive workmanship, which were used instead of money by the ancient inhabitants of Dacia and Pannonia; and the necklaces, strings of gold, pearls, diadems, and other ornaments of the same period. A separate compartment contains a treasure found in Hungary in the eighteenth century, and belonging now to the Imperial Cabinet of Antiquities of Vienna. It consists of several golden vessels, and a trumpet of great antiquity. One of the vessels is decorated with a Hun warrior on horseback, and with an "Emese," the Leda of the Scythians, the mother of Almos, the founder of the Hungarian nation. In this legend an eagle, the divine bird of the Scythians, takes the place of the swan of classic mythology. The vessels bear inscriptions nobody has ever been able to decipher.

During three hundred years the National Museum has possessed and exhibited a splendid collection of enamel and niello Roman ornaments, cameos, and vessels discovered in Hungary. These productions of a more advanced civilisation give some variety to the exhibits of this room.

The next two rooms, the largest and the most beautiful of the exhibition, are partly occupied by the great collection of ecclesiastic goldsmiths' work, of the splendour and value of which one can scarcely form an idea. It is difficult to determine which is the most ancient of these exhibits. In the seventh century crosses are already adorned with almandines (a kind of garnet), a favourite stone with mediæval Hungarian artists; and they become more and more elaborate, until they attain the marvellous perfection of the many Hungarian and Italian crosses which are exhibited. Very remarkable for purity of style is the Roumanian cross of Iglan, one of the most perfect of its kind.

As for communion cups, we are dazzled by their quantity and richness. Some of them are literally covered with enamelling; others are decked with precious gems and pearls, and almost all are masterpieces of workmanship, like the communion cup of the cathedral of Kasehan, a marvel of Gothic style; two golden cups in the style of the late Renaissance, the golden cup of the cathedral of Neutra, etc. Many mediæval cups and other altar ornaments have the form of monsters or dragons, red deer, lions, and centaurs; later on the pure style of the Renaissance triumphs over these weird creations of minds yet filled with the symbols of paganism. As for the fantastic and graceful products of the Gothic era, they are best and most richly represented. The hundreds of rich monstrances, studded with gems, are almost exclusively of this style, as, for instance, the monstrance of Agram, the delicate workmanship of which one might admire for hours. Most beautiful are also the many reliquaries and little altars, which form a sort of microscopic architecture of overwhelming beauty and finish. Gold and silver, ebony and ivory, are used for these small masterpieces, which are entirely covered with precious stones, enamel, and allegorical figures of most perfect style and execution.

Sometimes busts of saints are used as reliquaries, as, for instance, the silver busts of St. Ladislas and St. Stephen, kings of Hungary. The latter, the artistic value of which is greater than its real one, is a very remarkable work of the great Italian sculptor, Bernini. The bust is over life-size, entirely of beaten silver, and adorned with precious stones. The pedestal bears the crest of Cardinal Berberini, afterwards Pope Urban VIII., who ordered this work in 1635. It serves as a reliquary, and belongs to the Cathedral of Agram.

The collection of ornaments for church attire, consisting of episcopal crosses, clasps, and rings, is equally rich. We admired especially two clasps of the purest Gothic style; in these two dragons support a Gothic edifice, the centre of which is formed by the enamelled double crest of Hungary and the House of Anjou. The crest is supported on the two sides by griffins of the most admirable workmanship. Figures of saints and symbolic animals fill the many small niches of the clasp.

The central compartment of the third room contains the collection of crowns. The exhibition presents us this symbol of sovereignty in every form it assumed during the different periods of history. The simple golden ring of the barbarian princes goes through many transformations, until it attains the artistic perfection of the crown which Constantine Monomachus, Emperor of the East, sent to the Duke of Hungary. This crown is a splendid specimen of Byzantine art of the eleventh century.

Whilst the goldsmiths of early mediæval times devoted themselves almost entirely to ecclesiastical work, the artists of the Renaissance attained the highest degree of perfection in a more worldly direction. Their marvellous productions show a strange mixture of Occidental and Oriental style and taste. Our grand seigneurs of bygone times (not unlike those of modern ones) were rather inclined to encourage foreign artists, especially the celebrated goldsmiths of Germany. This compelled Hungarian artists to imitate German models, which they adorned with local devices, and, during the Turkish wars, with Oriental ones. They further added their special mode of enamelling, as well as local armorial figures and crests.

One of the most remarkable of this period is the famous golden cup of the Palffys. This cup, of splendid workmanship, with purple enamelling, weighs 830 ducats, and was given in 1598 by the Austrians to Nicholas Palffy, for his heroic behaviour at the siege of the city of Raab. Another masterpiece is a marvellous cup, belonging to Prince Esterhazy. It is literally covered with enamelled figures, diamonds, and other precious stones. The pedestal of the cup is composed of a toad, surrounded with precious stones, surmounted by a naked child, which supports with its two hands the cup itself. The toad is enamelled green, its back is carved of one huge onyx, whilst the head, neck, and feet show yellow enamelling, with black spots. The chalices of the enamelled flowers of the cup are filled with diamonds, rubies, emeralds, and especially with opals of wonderful fire and immense value.

Amongst the personal ornaments of past centuries, what the English call a pendant and the French a pendeloque, known also by the name of faveur, was the most conspicuous. In the sixteenth and seventeenth centuries it was the rage, and even nowadays it is the pride of our ladies to possess one or two such heirlooms in their jewel-case.

In France the pendeloque was just as much in vogue as in Hungary; and yet the Exposition of 1878 could collect only thirty. At our Exhibition there are 120 of them, all more or less worthy of the admiration and serious study of artists and amateurs. The delicate and skilful brush of some master of miniature painting would be wanted to produce this marvellous collection. What fantastic combinations of the three kingdoms of nature! What a fertility of invention! The animals employed for pendeloques are generally the eagle, the pelican, the dove, the parrot, and the stag, the body of the animal being composed of one enormous pearl, or some precious stone, whilst the plumage or the skin presents the most wonderful effects of enamelling. The central piece is surrounded by leaves, flowers, and arabesques of artistic finish and infinite variety of invention.

Of course, symbols are the favourite devices of these small masterpieces. We see upon the ornaments of the ancients, the god of Love blindfolded, bow in hand, or playing some instrument. Later on Christian symbols are used almost exclusively. The Holy Virgin with or without the child Jesus; the Virgin in adoration; the child Jesus with little St. John; St. Cecilia with the harp, surrounded by angels, are all favourite subjects. Even more frequent are St. Michael or St. George killing the dragon with a lance. Love and friendship have also their symbols. The most frequently employed are two lovers in a niche in the form of a heart; the initial A. (amicitia) the two ends of which are held by two masculine figures; the symbols of Faith, Love, and Hope, as on the beautiful pendeloques worn by Prince Gabriel Bethlen and his pages at his nuptials with Catherine of Brandenburg in 1628; moreover, Cupid making soap-bubbles, and an immense variety of others, the description of which which would lead us too far. One of the most beautiful of all is the pendeloque of Count Andrassy, with a Cupid and a Venus of Benvenuto Collini's.

Most of the pendeloques and other jewels are the works of Hungarian and Transylvanian artists. Of course, the Oriental style and taste predominates upon most of the precious necklaces, earrings, belts, hair-pins, and other ornaments, nay, even upon the curious filigree work of the Saxons of Transylvania. Most beautiful is a Transylvanian belt of the sixteenth century, worked in enamel, and decorated with precious stones; likewise the famous necklace of Queen Isabel, after the model of which the municipality of Buda-Pesth ordered the necklace presented to the Crown Princess Stephanie as a wedding gift. An infinite variety of beautifully chiselled and richly enamelled bracelets, necklaces, and belts is heaped up in the different compartments of the same rooms, which also contain most interesting bibelots of the sixteenth and seventeenth centuries, enamelled watches, tabatières, small caskets, and a rich collection of episcopal crosses of great value. Of dazzling beauty are also the many cups and goblets carved of one piece of precious stone. Upon the golden border of an amethyst cup, belonging to the treasury of Prince Esterhazy, we read the inscription that King Leopold and Queen Margeret had drunk out of it, when paying a visit to the castle of Esterhazy.

The next room is very picturesquely decorated with ancient Hungarian and Oriental arms of more or less value. Very original is a group of twelve heads of horses, harnessed after the old Hungarian fashion, with aigrettes studded with jewels, and saddles artistically embroidered with gold, pearls, and precious stones. This and the fifth room are both filled with marvels of mediæval workmanship, destined for decoration as well as for useful purposes. We have here more than fifteen hundred caskets, cups, and jugs of embossed silver and gold, enormous dishes and huge chandeliers of the same metals, and other decorations for the table, which testify to the artistic and luxurious tastes of our ancestors. Most beautiful are the Transylvanian jugs of the seventeenth centuy, the Esterhazy golden jug, a jug of beaten silver of the seventeenth century, and last, but not least, the admirable jugs and cups of Sebastian Hann, the Benvenuto Cellini of the Transylvanian Saxons. His works bear the date of 1697, and are of the most exquisite finish.

In the next compartment eighteen golden goblets, pushed one into another, and decorated with double crests of silver and vermilion, arrest our eye. Eighteen plates and as many dishes of embossed silver complete this service of royal splendour, which is a heirloom of the Counts Teleky.

We cannot close our description without referring to the most monumental piece of decorative table-plate of the whole exhibition—the enormous jug of the Losonczys, which belongs now to the treasury of the Esterhazys. This immense vessel was destined to receive the warm wine our ancestors preferred to every other drink. There are exquisitely worked faucets applied to its sides. The jug, which bears the date of 1548, stands upon an embossed silver dish, and jug and plate are decorated with the same animal devices.

Evidently our ancestors delighted in luxurious table decoration; and involuntarily we ask whether the progress of civilisation, by giving a more practical and realistic turn to the mind, has not rather diminished than increased the genius of artists as well as the taste of amateurs?—*The Queen.*

Stage Diamonds.

"Let me see," said he, smilingly, "Rhea is going to have a dress of Spanish lace next season, covered with the diamonds that she received from the Emperor of Russia, isn't she? She's going to wear it in her great *rôle*, eh?"

"Such is the meagre but inflaming announcement that I have seen in the newspapers."

"Well," said he, "you ask Mr. Jimmy Morrissey to let you see the box that Mlle Rhea's diamonds travel in when the campaign opens.

"Why the box? I don't want to see the box."

"Oh, yes you do. You want to look at it well and notice if it is made of mahogany, polished, with two heavy brass bands running round it with a crest engraved on them."

"And if I do notice all this?"

"Why then you'll know that it's the regular old box and stock of diamonds that have been doing service for six or eight years. Let me see. The jewels started with Modjeska.

"See here," said he, seeing that I looked incredulous, "you don't mean to tell me that you are not up to the diamond dodge? Sit down there and I'll tell you something about it.

"In the first place, there are only two women familiar to American audiences who have got real diamonds enough to make an exhibition. One of them is Mme. Patti, the other is Mme. Janauschek, and they never do exhibit them.

"By the way, speaking of Janauschek, I see that the announcements of Ristori's coming are supplemented in one or two of the dramatic paragraphs with the additional intelligence that she is the greatest histrionic artist America has ever seen. That sounds very much as if America had never seen Rachel and hadn't got Janauschek yet. I wish you'd do me the favour to say that in my opinion Ristori never was and never will be as great an artist as Janauschek. She hasn't got the versatility, the emotion, the intensity or the power of Janauschek. Why, they played simultaneously here in 1866, and in the same *rôles*, and if you go back to the criticisms of the *World* you will find that Janauschek walked away with the honours. Certainly nobody supposes that Ristori could play *Hortense* or *Brunhilde*, and after seeing Janauschek play Mr. Edwin Booth into the wings with her *Lady Macbeth* I don't think Ristori's artificial handling of that *rôle* would amount to much. But that isn't what I was going to tell you."

"No, it isn't! It was something about a mahogany box."

"Yes. Well, when Mr. H. J. Sargent started in the Modjeska season he had a countess on his hands who, so far as the theatrical business was concerned, was destitute of diamonds.

"She had some very fine jewels, as became a Polish nobleman's wife, but she wasn't going to have them trotted out. This annoyed Sargent, who knew perfectly well that in the Mississippi Valley there was an unassailable conviction that any foreign actress who had not received at least two diamond necklaces from the Emperor of Russia couldn't amount to much.

"One day when he had just got into—Buffalo, I think it was, to play that night, he saw in a jeweller's window a very showy necklace of stage diamonds. He went in and found that it had been made for Mary Anderson to wear in *Pauline*, and she had refused to take it because her directions had not been followed with regard to the setting. 'How much do you want for it?' asked Sargent. 'Forty dollars,' said the jeweller. 'Give you thirty-five,' said Sargent. Then they compromised on thirty-seven.

"'Now, I want a box,' says the manager, and after running all over the town he got hold of a second-hand mahogany casket bound in brass. 'How long will it take you to polish this up and put two heavy handles on it?' he asked of the jeweller.

"'Have it done in an hour,' was the assurance of the obliging merchant.

"In an hour Sargent was on his way to the theatre with that box under his arm. He noticed with pensive care that the town had not thrilled much as yet under the flowing announcement that the Countess Bojenta would appear that night. Trade flowed on in its unbroken currents. Life was unperturbed. The great prosaic interests of the world did not appear to care whether Bojenta or Johannes had arrived.

"Mr. Sargent strode into the office of the theatre. He was flushed and excited. 'Where's your safe? he asked. They had not got any safe. He put the box down on the table and kept his hand on it. 'No safe!' he cried. 'What are you talking about? Do you know what's in that box? It's got jewellery in it worth $50,000. I'm not going to take the responsibility of the thing any longer. Here, send to the police station. I must have a couple of men to watch it while I go to the bank.'

"Then he got two officers to stay there and not take their eyes off the mahogany box, while he went off to the hotel and opened a bottle of wine. As he had shouted a good deal there was quite a group collected round the office. And in less than half-an-hour the Bojenta current began to stir along the sluggish street. He let it work. When the two policemen were relieved the entire force knew of the Emperor of Russia's gift, and before 6 o'clock they had quadrupled the rumour by means of wives and sisters and sweethearts. At 8 o'clock there was only one person in that city who had not heard of the Emperor of Russia's gift.

"That person was the Countess Bojenta.

"The mahogany box worked so well that Sargent began to look upon it as a sort of Aladdin's lamp, and he rubbed it up every day and got a new idea.

"The first inspiration was to have it stolen. Hitherto only the policemen had made obeisance to it. Now the telegraph and the night editors fell down. The wires flashed it through sixteen States. The Emperor's diamond necklace was gone. A heavy reward was offered. It must have cost Sargent something to hire detectives to work up the case. I believe the *Bellefountain Bugle* published the original despatch of condolence from the Emperor of Russia.

"When the sympathy for Modjeska had become national, and there was some likelihood of the emotional women of the country making up a fund to replace her diamonds, a rash reporter forced an entrance to her boudoir one day when Sargent's back was turned, and found that her distress at the unparalleled loss was altogether disproportionate to the circumstances.

"An infamous and suborned press then began to give way to ignoble doubts about the robbery, and the *Bellefountain Bugle* even printed an editorial throwing suspicion not only on the Emperor's gift, but upon the Emperor himself.

"Sargent was equal to the emergency. He took two of the most versatile and copious pressmen into his confidence. He pledged them to secrecy, that being the shortest cut to publicity. 'Now,' he said, 'I have a confession to make. I was so afraid that the Countess's jewels would be stolen that I had an imitation set made just like them for show purposes, and it was the imitation set that was stolen. The real gems are here.'

"With that he unlocked the safe and got out the mahogany box.

"'Gentlemen,' he observed, as he unlocked the box, 'you can examine those jewels. You can see for yourself whether they are of the first water. I'll send for an expert if you wish it.'

"The versatile and copious drew themselves up with dignity, 'As if,' they said, 'we are not experts enough to tell real gems like those from stage jewels!'

"This dodge worked very well for a few days. A new crop of stories broke out about the Emperor's necklace. But the original syndicate of night editors and local reporters who had sworn to the real robbery felt aggrieved. A committee waited on Mr. Sargent. 'See here,' said the spokesman, 'as we understand this thing, you agree to have the real necklace stolen, not an imitation one. It's an outrage on the public and the press. You're a fraud.'

"'Go slow, my dear fellows,' said Sargent. 'I don't think you've got the thing right. If you will not give me away, I'll tell you. The fact is, I set that story going about the bogus necklace having been stolen, in hopes that it would reach the thieves and make them send back the real one. Of course, you saw the real necklace two months ago, and would know it if you saw it again.'

"The committee remarked that they should smile.

"'Very well,' said Sargent; 'here's the only necklace I've got now.'

"Then out came the mahogany box.

"'If you think that that is the genuine article, all I've got to say is, you are not up in stage jewels. If you'd like one of those pieces of glass as a souvenir, just pull it off.'

"The American press was pretty equally divided by this time on the question of the diamond necklace, and the American managers were getting to have a superstitious regard for Sargent and his box.

"But Sargent had got enough of it, and he sold out the scheme to some other manager.

"I think it was six or eight months afterwards that Minnie Palmer lost her diamonds, and, meeting John Rodgers one day, he began to tell me about it. 'The first thing the thieves took was a diamond necklace,' said he. 'But they left the casket.'

"Then out came the mahogany box.

"'John,' said I, 'I've seen that box before.'

"'Oh, well,' said he, 'I don't mind telling you privately that I had this made for show purposes' ——

"John never got any further. We looked in each other's eyes and a dead silence reigned.

"Well, a year after, Kate Putnam began to be celebrated for her diamonds. I don't remember whether it was the Emperor of Russia or of Hayti who gavo her a diamond necklace, but there was a great deal of anxiety observable in the press and the community for fear she'd be robbed; and Barron told me himself that the responsibility of it was undermining his health.

"'Let me see it,' I said.

"Then, by Jove, out came that mahogany box!

"'Never mind,' I said; 'you needn't open it. I've seen the necklace. The Emperor of Russia showed it to me before he presented it.'

"That ended Putnam.

"Well the next one was Aimée. I suppose you know that Aimée at her last season in America, found it necessary to supplement her voice with a few diamond necklaces. I suppose Aimée had more Kohinoors than an Indian princess, and Grau asked me in one day to hear about it. 'Would you like to see some of the gems?'

"'Yes,' I said.

"By the eternal stones of Venice—out came that infernal mahogany box!

"'Look here, Grau,' said I, 'I can stand almost anything, but there's one thing that makes a fiend incarnate of me—it's a mahogany box. I'm surprised that you so far forget yourself.'

"He has never spoken to me since. Now, what I want you to do when you see Jimmy is to notice if the jewels that the Emperor of Russia gave Rhea are kept in a mahogany box, with two brass straps and a crest."

"I will."—(*New York Jewellers' Circular.*)

The Precious Metals in Mexico.

In 1808, the population of Mexico consisted of six millions; it rose in 1856 to 7,829,000, and is now estimated to exceed twelve millions. The greater part of the inhabitants belong to the indigenous race of Mexican Indians, who retain their original dialects, although Spanish is the official language of the country.

The state of Chihuahua is considered the richest in the Mexican Republic. It is divided into twenty cantons, in which there are 127 mining districts; and in these districts 575 mines have been worked since the Spanish conquest.

Indeed, the greater portion of the gold and silver mines that are now in action were also worked at the time of the Spanish conquest. While the country was under Spanish rule, that is to say from 1537 to 1821, the mines produced gold to the amount of £13,753,682, and silver to the amount of £417,253,940. Since that period, and up to 1880, the mines produced gold to the amount of £180,131,662. The total value of the gold and silver produced between 1537 and 1880 is £621,022,042, the average annual production being to the value of £1,812,000. Compared with this, California, Nevada, Colorado, Utah, Dakota, Montana, Idaho, Oregon, Washington, New Mexico, and Arizona, have produced the precious metals from 1848 to 1882, of a total average value of £13,560,000; and a large portion of this was obtained from territory which formerly belonged to Mexico.

It has been found necessary to abandon mines, even when yielding more than nine troy pounds of silver to the ton of ore, on account of the difficulty of transport and want of labour; but with systematic mining and economical methods of reducing the metal, added to the necessary capital and improved means of communication, Mexico would regain the foremost position among countries producing the precious metals which she held up to 1848. The completion of the central railway, which traverses the state of Chihuahua, will contribute towards bringing about this result. It has often been said that there is no coal in Mexico, and that this want will prove an obstacle to the development of the natural resources. This, however, is not the case, as the Government has published an official list of localities where coal deposits exist. Petroleum is also found in large quantities.

An Apology.

The writer of an article on the manufacture of musical boxes at St. Croix has received, through Messrs. Paillard and Co., a communication from the trustees and executors of Mr. Jeanrenaud, complaining that in the article referred to Mr. Jeanrenaud has been called a "workman," whereas he was "manufacturer" of musical boxes. Such being the case, the writer is desirous of offering to Mr. Jeanrenaud's trustees, to his bereaved widow, and every member of his family the fullest apology for this mistake, and at the same time he desires to state that nothing could have been more foreign to his object than to have shown any want of respect to a man of such undoubted genius.

Guide to Calculate the Value of Gold and Silver after the various Assay Reports.

By H. Bush, Hull.*

Continued from page 29.

Practical Hints, Tables, and Rules, for Alloying the various Gold Standards recognised by the Goldsmiths' Hall, London, and the Provincial Assay Offices.

Or, we have 36 dwts. of sovereign gold which we want to reduce to 15-carat by adding 9-carat gold: we proceed as follows—

36 dwts. = 1·800 × (22 — 15) 7 = 12600 ÷ (15 — 9) 6 = 2·100
Result 2·100 = 2 ozs. 2 dwts. of 9-carat gold,
to be added to 1·800 ,, 1 ,, 16 ,, of sovereign gold,
realising 3·900 = 3 ozs. 18 dwts. of 15-carat gold.

Or, 36 dwts. = 1·800 of American coin gold to be reduced to 15-carat gold by adding 9-carat—

36 dwts. = 1·800 × (900 — 625) 275 = 495000 ÷ (625 — 375) 250 = 1·980.
Result 1·980 = 1 oz. 19 dwts. 14$\frac{1}{2}$ grs. of 9-carat gold,
to be added to 1·800 ,, 1 ,, 16 ,, 0 ,, of American coin gold,
Realising 3·780 = 3 ozs. 15 dwts. 14$\frac{1}{2}$ grs. of 15-carat gold.

Table for Alloying the various qualities of Gold, irrespective of the ordinary Standards, from British and American, French, or German Coin Gold.

	AMOUNT OF ALLOY TO BE ADDED TO ONE OUNCE OF—	
	British Coin Gold, 22 carat = ·916$\frac{2}{3}$ fine.	American Coin Gold, 21$\frac{3}{5}$ carat = ·900 fine.
To prepare 6 carat = ·250 Gold	add 2 · 666$\frac{2}{3}$ oz. of Alloy.	add 2 · 600 oz. of Alloy.
,, 7 ,, ,, ·291$\frac{2}{3}$,, ...	,, 2 · 142$\frac{6}{7}$,, ,,	,, 2 · 085$\frac{5}{7}$,, ,,
,, 8 ,, ,, ·333$\frac{1}{3}$,, ...	,, 1 · 750 ,, ,,	,, 1 · 700 ,, ,,
,, 9 ,, ,, ·375 ,, ...	,, 1 · 444$\frac{4}{9}$,, ,,	,, 1 · 400 ,, ,,
,, 10 ,, ,, ·416$\frac{2}{3}$,, ...	,, 1 · 200 ,, ,,	,, 1 · 160 ,, ,,
,, 11 ,, ,, ·458$\frac{1}{3}$,, ...	,, 1 · 000 ,, ,,	,, 0 · 963$\frac{7}{11}$,, ,,
,, 12 ,, ,, ·500 ,, ...	,, 0 · 833$\frac{1}{3}$,, ,,	,, 0 · 800 ,, ,,
,, 13 ,, ,, ·541$\frac{2}{3}$,, ...	,, 0 · 692$\frac{4}{13}$,, ,,	,, 0 · 661$\frac{7}{13}$,, ,,
,, 14 ,, ,, ·583$\frac{1}{3}$,, ...	,, 0 · 571$\frac{3}{7}$,, ,,	,, 0 · 542$\frac{6}{7}$,, ,,
,, 15 ,, ,, ·625 ,, ...	,, 0 · 466$\frac{2}{3}$,, ,,	,, 0 · 440 ,, ,,
,, 16 ,, ,, ·666$\frac{2}{3}$,, ...	,, 0 · 375 ,, ,,	,, 0 · 350 ,, ,,
,, 17 ,, ,, ·708$\frac{1}{3}$,, ...	,, 0 · 294$\frac{2}{17}$,, ,,	,, 0 · 270$\frac{1}{17}$,, ,,
,, 18 ,, ,, ·750 ,, ...	,, 0 · 222$\frac{2}{9}$,, ,,	,, 0 · 200 ,, ,,
,, 19 ,, ,, ·791$\frac{2}{3}$,, ...	,, 0 · 157$\frac{17}{19}$,, ,,	,, 0 · 142$\frac{2}{19}$,, ,,
,, 20 ,, ,, ·833$\frac{1}{3}$,, ...	,, 0 · 100 ,, ,,	,, 0 · 080 ,, ,,
,, 21 ,, ,, ·875 ,, ...	,, 0 · 047$\frac{13}{21}$,, ,,	,, 0 · 028$\frac{4}{7}$,, ,,

The decimal system for dividing the ounce troy affords the facility to determine the amount of alloy to be added to decimals of an ounce of gold in this table, viz. :—

For alloying $\frac{3}{10}$ oz. of British coin gold to 9-carat gold—

Take three times of the tenth part of 1·444 oz., being 0·433 oz. of alloy.

And for $\frac{3}{10}$ oz. of American coin gold to be alloyed to 9-carat gold—

Take likewise three times of the tenth part of 1·400 oz., being 0·420 oz. of alloy.

For quantities containing ounces and decimals of coin gold, the whole quantity of alloy is determined by using the rule given on page 29.

For alloying fractions of a carat along with full carats, viz. :—14$\frac{1}{2}$-carat gold, proceed as follows :—

One-ounce of British coin gold to be reduced to 14$\frac{1}{2}$-carat—

Take the difference of the qualities, 22 — 14$\frac{1}{2}$ = 7$\frac{1}{2}$, and divide by 14$\frac{1}{2}$, which is best effected by converting the divisor and dividend into halves, viz. :—difference of carats 7$\frac{1}{2}$ = 15 halves, being the dividend, and quality to be alloyed, 14$\frac{1}{2}$ = 29 halves, the divisor; now for dividing the 15 by 29 and produce decimals, convert the 15 into thousandths by adding three noughts = 15000, and divide by
29) 15000 (·517$\frac{7}{29}$ oz. of alloy to one ounce of British coin gold produces 14$\frac{1}{2}$ carat gold.

(*To be continued.*)

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Trade Notes.

We have received from Messrs. B. H. Joseph and Co., of Birmingham, one of their recently improved Standard Size Ring Sticks. Instead of being made exclusively of brass, it is of wood with an external covering of brass, in consequence of which its weight is largely diminished. The improvement deserves the notice of the trade.

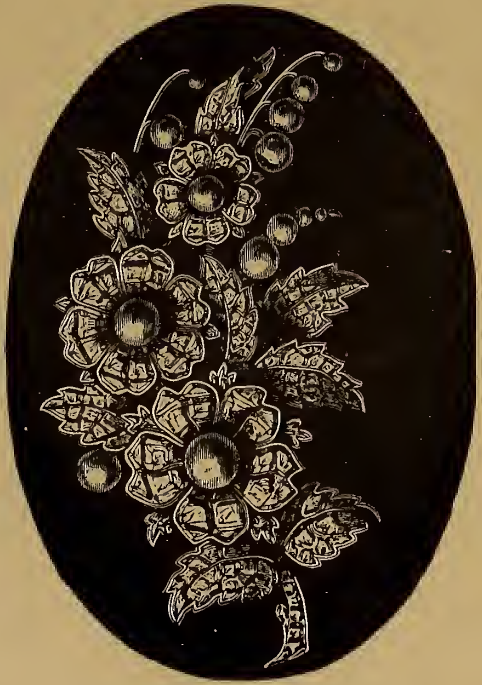
The Society of Arts is publishing a few of their Canton lectures which have been given at the Society's House from time to time, and among the number is a course of three lectures on watchmaking, by Edward Rigg, M.A., price of which is one shilling. A copy can be forwarded on receipt of thirteen stamps.

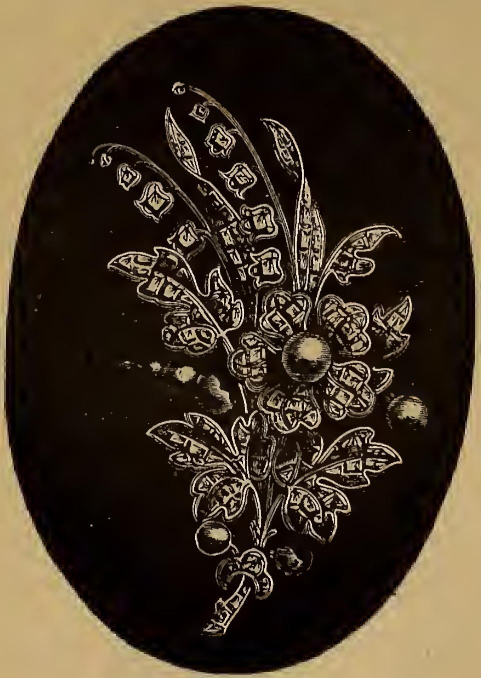
According to Kemp's *Mercantile Gazette* the number of failures in England and Wales in the jewellery trade gazetted during the four weeks ending September 27th was as follows:—

1884	14
1883	19
1882	40

Supplement to the Watchmaker, Jeweller, and Silversmith, October, 1884.

MONTHLY SUPPLEMENT OF DESIGNS.





THE WATCHMAKER JEWELLER AND SILVERSMITH

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ILLUSTRATED SUPPLEMENT:—"Designs for Modern Jewellery."

The Patents, Designs, and Trade Marks Act of 1883.

By C. Stuart Murray.

(Concluded from page 51.)

THE Use of the Royal Arms.—In a former number we spoke of the interdict which the new Act had set forth with respect to the indiscriminate use of the Royal Arms and the effect that it would be likely to have upon the invoices, bill heads, and so on of some thousands of tradesmen. We made a few comments at the time upon such a provision being in a Patent Act at all, and mentioned a plan as to how the Royal Lion and Unicorn might be "sported" without incurring the danger of a penalty. Since we last wrote, however, a brace of innocents have been in the lately fashioned legal net; but before we state their case we may as well give the dreaded section of the "pains and penalties" *in extenso*."

"Section 106.—Any person who, without the authority of Her Majesty, or any of the Royal Family, or of any Government Department, assumes or uses in connection with any trade, business, calling, or profession, the Royal Arms, or arms so nearly resembling the same as to be calculated to deceive in such a manner, as to be calculated to lead other persons to believe that he is carrying on his trade, business, calling, or profession by or under such authority as aforesaid, shall be liable on summary conviction to a fine not exceeding twenty pounds."

The first victims to this provision were Messrs. A. and G. Taylor, photographers, of 153, Regent-street. They were summoned to Marlborough-street police court by one William Turner, of 140, Kennington-lane, for unlawfully and without the authority of the Queen using the Royal Arms, or arms resembling them. Mr. Newton, the magistrate, adjourned the case after taking some evidence. Upon the adjournment, he stated that he understood that the Royal Arms had been removed.

Mr. Wontner, who appeared for the defendants, replied that that was so, and pleaded that they were not cognisant that they had no right to use the Royal Arms. Their claim to do so was founded upon the fact that they had photographed the Queen and members of the Royal Family, and the servants of the Royal household, and, therefore, they believed that they had authority to use the Royal Arms. The Solicitor-General had stated that he considered that the new Act did not apply to a case like the one before the court. Acting under advice the Messrs. Taylor had, as the magistrate was correctly informed, removed the arms in question. Mr. Wontner said that, had the proceedings been instituted from the Lord Chamberlain's office, he would have cried *peccavi* at once; but as no gentleman from that office was present, and the prosecution was not instituted by a public authority, and by a person not in the public service, but for the sake of gaining half the amount of any penalty which might be imposed, he had to ask that the summons might be dismissed. Mr. Newton said, that as the arms had been removed—no person having a right to use them without permission, he should order the defendants to pay one shilling fine and two shillings costs. This conviction has clearly established the reality of the Act, and the reason why the fine was merely nominal was, no doubt, intended to express the magistrate's opinion of persons acting the part of common informers for the sake of half the penalty due to them.

Another case was heard in the Chancery Division of the High Court of Justice, which belonged to Part III. of the Act; namely, Designs. A Mr. Grafton, a calico printer, took a Mr. Watson, another calico printer, before Mr. Justice Chitty, and obtained an injunction against Watson, to restrain him, until the trial of the action, from printing, producing, or offering for sale any goods not being of the plaintiff's manufacture, to which might be applied any registered pattern or design in such obvious imitation of the plaintiff's registered designs as to be calculated to deceive. Both parties carry on business in Manchester, and the plaintiff had registered four designs, or patterns, which were intended for publication and sale as a fashion for the present year. Those designs consisted of groups or combinations of flowers, leaves, and sprays, and it appeared that the defendant had employed a designer to imitate the pattern as closely as might be without pirating the plaintiff's copyright. The defendant contended that he had an indisputable right to follow the fashion of the day, and carried the case before the Lords Justices of Appeal to have the injunction of Mr. Justice Chitty set aside. After hearing the arguments on either side the Court dismissed the appeal, holding that the injunction was a proper one until the action upon the merits should be tried.

So far we meet with some instruction here, for if, instead of calico printing, we substitute watchmaking, jewellery, or silver work, we have something to guide us. The opinion of the three Lords Justices upon the whole infringement by the defendant may be gathered from their holding that the plaintiff's case was a proper one for legal remedy, thereby supporting the decision of the court below. What chance the defendant may have in the trial before a jury upon the merits of the issue can only be now considered by each reader for himself.

Rules.—The Board of Trade have published no fewer than seventy-eight rules of one kind and another, and the Law Officers fourteen, in relation to the way in which inventors, designers, and patentees, are to avail themselves of the provisions of the Act. As these rules are quite in keeping with legal verbosity in general, we shall have to boil them down also and extract as much useful information as we can from that process. They came into operation on the 1st of January, 1884, and the interpretation of the words used shall be the same as such words in the Act itself. They declare that the Patent Office shall be open upon all ordinary days of business except Christmas Day, Good Friday, the Queen's Birthday, Public Fasts, or Thanksgiving, and Bank Holidays. The method of application for a patent is summarised from the more elaborate directions in the Act itself, and an agent may be employed. The application must be accompanied by a statement of an address to which all notices, &c., may be sent from the Patent Office.

All documents and copies of documents sent to or left at the Patent Office or otherwise furnished thereto, shall be either written or printed in large legible characters in the English language upon strong wide-ruled paper (on one side only) of a size of 13 inches by 8 inches, leaving a margin of 2 inches on the left hand part of each written sheet, and the signatures must be written in a large and legible hand. The Comptroller may require Duplicates to be left at any time. Before the Comptroller exercises any of the discretionary powers vested in him by the Act, of an adverse kind, either with respect to a patent, or for an amendment of a specification, he shall give at least ten days' notice, or such longer notice as he may think fit, to the party interested, in order that the latter may be heard either by himself or agent, as may be.

Within five days after such notice would be delivered by the ordinary course of post, or such longer time as may be appointed, the Comptroller is to be informed whether or not the applicant intends to be heard upon the matter. There does not seem to be any provision in this rule for the non-delivery of postal notices, so that the Comptroller on the one hand, and the applicant on the other, may "take a leap in the dark." Probably, there may be some arrangement in the office to prevent any mishap of the kind. When an applicant for a non-completed patent has obtained a certificate from the Board of Trade that he is about to show his invention at an industrial or international exhibition, he must give the Comptroller seven days' notice of his intention to do so.

An important rule comes in here, and will be found very valuable:—

"Any document for the amending of which no special provision is made by the Act itself, may be amended, and any irregularity in procedure, which in the opinion of the Comptroller may be obviated without detriment to the interest of any person, may be corrected upon such terms as the Comptroller may think fit. Any document of any kind that is authorised or required to be left at the Patent Office under these rules, may be sent by a prepaid letter through the post, and if so sent such letter or other paper shall be deemed to have been duly delivered."

From the two rules about letter posting it seems quite clear that all documents, notices, etc., passing through the post office will be treated as registered letters; and that is, no doubt, the special provision that is intended, although not mentioned, by fixing so many days from the time of posting to the time of delivery as being taken to mean the delivery itself. Further on it is stated that, establishing such service, it will only be sufficient to prove that the letter was properly addressed and put into the post. That will be a great relief in this matter.

Affidavits may, except where some rule prescribes differently, be sworn to in any of the following ways. In the British dominions, before any judge, court, justice, or any other person duly authorised to administer an oath. Out of the British dominions, a British minister, consul or vice consul is clothed with the same authority, as well as a notary public, before a judge or court of the country. Statutory declarations follow the same mode of procedure. There is a rule bearing upon deceased inventors, or applicants. An application for a patent by the legal representative of a person who has died possessed of an invention shall be accompanied by an official copy of or extract from his will, or the letters of administration granted of his estate and effects, in proof of the applicant's title as such legal representative. In this rule nothing whatever is said about an applicant for a patent dying without a will; but, very likely, the Comptroller can deal with such a case.

When an application for a patent has been accepted the intending patentee must advertise the fact in the journal of the Patent Office. When that advertisement has been published, the complete specification, with such drawings as belong to it, may be inspected at the Patent Office upon payment of the prescribed fee. Applications communicated from abroad can be made upon a form obtainable at the Patent Office.

All drawings are to be made upon sheets or half sheets of imperial drawing-paper, and to be within a border-line of 19 inches by 12 inches, or 27 inches by 19 inches, with a margin of half an inch all round. A copy of such drawings will be required upon what is known as *rolled* imperial drawing paper, or upon thin Bristol board of the same dimensions as the original drawings. All the lines must be absolutely black, Indian ink of the best quality only is to be used, and the same strength or colour of the ink to be maintained throughout the drawing. Any shading must be in lines clearly and distinctly drawn, and as open as is consistent with the required effect. Section lines should not be too closely drawn. No colour must be used for any purpose upon the copy of the drawings. All letters and figures of reference must be bold and distinct. The border line should be one fine line only. The drawings must not be folded, but must be delivered at the Patent Office either in a perfectly flat state or rolled upon a roller so as to be free from creases or breaks. It will be as well to state here that as the original drawings are copied at the Patent Office by the photolithographic process, the mode laid down for delivering the new drawings must be rigidly adhered to. In addition to these drawings, there must be a copy illustrating the features of the invention of not larger size than 16 square inches. It occurs to us that there may be some ambiguity here which it would be as well to ascertain if practicable, as it is just probable that there has been a clerical error in drawing up this rule. The expression, 16 square inches, is plain enough; but many persons confound it with 16 inches square, which is another dimension altogether. Sixteen square inches would only in length be equal to 30 lines of the present column of this journal, and in breadth to but half an inch beyond the width of such column across the page. Now, a space of that size would afford very little room for illustrating the novelty of an invention; whereas, 16 inches *on the square*, if the reader will measure, would be *quite* a different affair, and would be much more in keeping with its purpose. Whichever way it may be, the drawing must be accompanied by a concise, explanatory statement on foolscap paper, and legibly written or printed.

Notice of opposition to grants follows what has been previously stated in the Act itself. The rule lays down that, within 14 days after the expiration of two months from the date of the advertisement of the acceptance of a complete specification, the opponent is to leave at the Patent Office statutory declarations in support of his opposition, and deliver a list of them to the applicant. Within 14 days after that the applicant is to "return the compliment" by leaving his reply in the same way, after which the opponent files his answer, and so far that closes the evidence. Then comes the fixing of the time for hearing, with seven days' notice of it to both parties.

If a patentee intends at the expiration of the fourth or eighth year from the date of his patent to keep it in force, he must, at least seven clear days before the expiration of any of the terms, give notice to the Comptroller, and leave a form duly stamped, with the prescribed fee of £50 or £100, as the case may be. The same procedure will hold good if he intends to pay only the annual fees in lieu of the above named sums. Any application for the enlargement of time for payment must state the particulars why the enlargement is required, when the Comptroller will exercise the discretion vested in him. The details for request for leave to amend must be accompanied by a copy of the original specification, showing in red ink the proposed amendment. This must be advertised in the Patent Office Journal. Any notice of opposition must be in similarly full details, and the usual opposition forms which have been already stated have to be gone through again.

Petitions for compulsory licenses must be addressed to the Board of Trade, and the nature of the claim and terms offered must be stated, along with the grounds upon which such license is claimed. The matter may either be granted at once, or referred to the Comptroller, subject to the usual opposition forms in both instances. There are rules bearing upon registration which are more formal than otherwise, and also particulars that have to be left at the Patent Office, such as proprietorship, title, etc., and the same for assignment. Certified copies of all documents, or extracts from patents, specifications, and other papers, can be had at the Patent Office upon payment of the usual fees. All general rules made by the Lord Chancellor in relation to all previous patent acts are now repealed.

There are 14 rules regulating the practice and proceedings on appeal to the "Law Officers," the Attorney and the Solicitor-Generals, which are much of the same character in principle as those that apply to the practice before the Comptroller, and need not be repeated here.

In concluding our explanation of the new Patents, Designs, and Trade Marks Act, we have endeavoured to make the needless repetitions and verbosity as plain as we possibly could. To reduce legal language to the precise meaning of business life has been a laborious task, and if we have been at all successful, we shall feel very gratified indeed and we hope that our readers will feel so themselves.

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Watch and Clock Making at the Polytechnic.

[Opening Lecture by J. Herrman.]

(*Continued from page 54.*)

ALSO, it is said, that such schools produce slow workmen. The answer to this, or rather a provision against this, is furnished by clauses 11, 13 and 14 in the prospectus,* of which clause 13 is the leading one, because it furnishes a strong incentive to all students to profit by their opportunities. That is, students will have the value of their work credited to them, and when it is disposed of the equivalent amount paid them, minus, perhaps, a small commission for selling. To provide against possible disappointment, I would here especially qualify myself, in order that this engagement or promise may not seem more than it is meant to be.

The method proposed is this:—Each student will have a special ledger account, and on his part will hold a small book, in which any finished work is put to his credit, and against which is set off the cost of materials, if paid for, for him. Now observe, no payment will be made for this directly such work is done, but on the sale of an article, each student, who has contributed any part will receive the value in cash that such part may be considered to be worth. There are several reasons that favour this course. Negatively, it will save the school from drifting into a trading concern, because it only acts as the agents of its students, it will prevent it also from developing into a factory, because instruction, and not production, remains the primary object. It removes from the mind of the student the impression that he has to work for the benefit of someone else (an impression which so often comes to the surface in the apprenticeship system, and works such disastrous results); and, lastly, the school will not enter the market as a competitor, but simply represent its students and thus evoke no trade jealousy and opposition; at least, this tendency will be reduced to a minimum. On the other hand, the interest of the student is maintained right through; he has an interest to see that all work which is connected with his is satisfactory, as well as in the agencies which the school may employ, to dispose of the work of the school. In reference to any means that may be used to enforce clause 11, it is hardly possible, for any suspicion to spring up in the mind of any student, that such are used merely to squeeze work out of him, and not purely for his benefit, and thus the chances of estrangement between teacher and student are minimised as far as possible. Moreover, one refractory student must at once be recognised, as a common hindrance, and therefore it will be the especial interest of the whole of the students to support the teacher to remove such an obstacle. (I do not use the term "remove" in the socialistic sense.) Should, however, any case occur, which threatens to defy discipline, clause 14 will prove the final remedy in the interest of the students and reputation of the school, though I shall be very reluctant to advise it.

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* See Watchmaker and Jeweller for September.

It may possibly occur to some of my hearers, that I have not yet referred to the means by which it can be possible to practise such a method as I have suggested in regard to the division of work, for some very exact system must be used, otherwise the store of separate parts would become little better than a marine store shop. For this or against this, I have, I think, made ample provision, and shall refer to it under my next sub-division, to which I now turn; that is,

The Method and Appliances.

One of the chief drawbacks in the English methods of watch manufactering, is a want of an efficient measurement. If you went the round of the manufacturers of watches, and asked them the measurement of the diameters of the wheels of their several kinds of watches, size and weight of balances, ratio of weight to size, and so on, how many could tell you? I think very few, because the whole system, or nearly so, is a process of relative approximation. Perhaps it may be advisable here to give some special definition as to the object of our intended system as regards manufacturing, in contradistinction from that of a factory. The simple difference is (but although simple as a definition, the principles vary vastly), we manufacture, or intend to manufacture, as the means to train students for the object in view—the system of a factory is to reverse this, to train young men that it may use them for production or manufacturing. Hence the latter is distinct from, and outside our object; we profess to finish, where the domain of a factory system would commence. It is in this sense, that I want you to view the introduction of any new tool—not to make the use of it subservient to a common, but for an entirely individual object, that is, to give individual students the means of doing work in the best manner and easiest way, hence, have professedly excluded methods, the working of which would require, so to speak, a museum of tools at their back, and without which they would be helpless. If I understand my duty aright, and the wish of the founder, it is this: To train students, so that they can best cope with practical life, hence to attach the most importance to such parts of instruction which is most important, rather than in mere accomplishments.

Clause 4 has reference to this, hence strictly, I ought to have made allusion to this under my first heading, but being directly associated with methods of appliances, I deferred it till now. I can, however, only point to it as a principle, because to enumerate the order in which such should follow, would in itself form an auxiliary subject.

It is perhaps not generally, indeed little, known, that there are escapement makers and finishers, who, if not the majority, are no small minority, who do not, and as a rule cannot pivot the escapement they make; therefore, in separating pivoting from construction in escapement making, I am not deviating from the law of the horological Medes and Persians, while the method suggested must tend to, and is proposed only for the object to benefit students.

That the provision is in harmony therewith, is proved by every-day experience, for where there is one escapement sent to Clerkenwell or anywhere else, for correction, there are a dozen for balance staffs or other new parts, because there are plenty of opportunities for getting the latter done, but not the former, or in other words, there is seldom a watch spoiled by reason of a single piece being done badly—however much it may interfere with performance—but there are scores of them ruined by reason of ignorance of principle, want of experience, and practice in restoring relative parts to their primary and rightful conditions.

To be able to re-make any new part, is very desirable, but every part is not equally important; there are degrees, and these degrees are determined by every day requirement. Thus to be able to fit a new balance staff is well, and under certain conditions may be indispensable, but it stands second in importance to making and repairing an escapement. To keep a youth at one thing, while his future interest demands attention or practice in another, is a mistake. Hence my rule will be, to put that in front which is of most importance in the daily reqirement—that is in the order of necessity—expediency and usefulness.

We will return now to the

Appliances, or Tools.

These may be sub-divided into shaping tools, and tools of measurement, but at the same time I want you to observe, that the improvement in tools for watch and clock making has been, and must be, chiefly in a combination of these two principles. In the ordinary file you have a shaping tool, the practised hand represents the principle of measurement, substitute for the hand a system of absolute measurement; and you have the wheel-cutting engine. So the drill is a shaping tool—its connection with an absolute means of measurements constitutes a template system. Thus the original character of the operation is completely changed, it is no longer skill and an intelligent method of producing a form, but simply experience in working any given machine, and thus the manipulator of the machine is no longer the virtual watch or clock maker, but the designer and constructor thereof. Looking at this fact from our tuitional point of view, the course to adopt—a course best calculated to the benefit of the student would be this, to make him first fully and practically acquainted with that which a machine is intended to do, make him first as independent of the machine as possible, and, having done that, let him do the work by any machine at command, and then he will not only know how to work the machine, but will know if it is performing the work as it should. It is in reference to unity of shaping and measuring that the deficiency in the English system makes itself evident. English work (some few items of watch and clock work excepted) is splendid, the shaping tool has done its work excellently, and if you could connect it with a more reliable system of measurement, the process of manufacturing would be immensely improved and systematised.

I stated "independent of the machine as far as possible," because of some machines we can never be independent. Whenever this is the case, it generally happens that it is the measuring section of the machine that makes such impossible, indeed any such an attempt an act of folly. Thus to cut or shape one tooth in a blank, would be no very difficult operation, but to shape another fifty-nine like it, would be a feat next to impossible, and its attempt might simply be termed horological juggling. Apart from the possible or impossible, we have one other consideration to guide us—as looked at from an individual standpoint — namely, the economy in using or not using a tool. For instance, if a machine tool costs £5, and saves you five minutes' work only once a week, that tool is a mere luxury; if, however, it enables you to do an hour's work in half an hour, it is an expediency, and if it performs the work in a manner it could not be done without it, it is a necessity.

I have already pointed out the need of measurement, now as to the difficulties. The difficulties consist in the size of the objects, and the absoluteness of the conditions. If we apply a rule to anything, we can measure small objects, perhaps, as well as large ones, but the same amount of error has an effect inversely proportional to their sizes, that is, the magnitude of the error may pass unnoticed in the larger, while in the smaller it unfits it for its purpose. But this does not comprise all the knotty points of this subject; we have to do, not only with minute objects, but with relative conditions, that is, one part must stand at a certain distance from another, and sometimes to a third, and a system of innumerable points must all be in one fixed relationship. All attempts to systemise this kind of manipulation have failed (I think I may say that) simply for want of a tool that unites the two principles in one, that is, shaping and measuring. Whenever you have these two operations performed by two separate tools, there is the tendency of error to creep in between the two operations. Here, then, is another case equivalent to the wheel cutting machine, where no handwork has proved the independency of such a tool, and, therefore, the use of such a machine is in harmony with the rule I have stated as to the selection. I would state here, that we have one at our command at the school. It unites the two principles in one, and thus represents a perfect tool. Though it will be used in the school, its inspection by others is at present more of a confidential character; when I get the patent transactions completed, I will give a special lecture on its principles, construction and use. It is the use or service of this tool which admits of the system first proposed, and the practice in complicated work, for when I refer to repeating work, I do not mean repairing such watches only, though I do mean that; but the absolute manufacture of a minute repeater, for those who choose to continue up to this. And, further, I do not mean the finishing of a repeating movement made in Switzerland, but the making of one in which not a single part has been imported. Startling as this may be, I am in a position to show that in the simplest possible manner, without copy or drawing, every point in a most complicated caliper, the most elaborate shape of its parts can be delineated and set out by a simple record of numbers. If this appears like egotism, please suspend your judgment till that time, when I shall be able to lay the whole plan before you; meantime, I would add that what I have stated as to its use in regard to complicated work holds good in reference to more simple, by which means an accurate account of sizes and distances can be kept, and the whole systemised, not by a process of approximation, nor by a process of making a hundred, that we may find ten that will do, but by a method, by which we can determine the magnitude of two acting parts, and their line of centres, without having to alter either one or the other two or three times. Given, that what I state is true, the plan of making parts of watches in section will appear practical, hence my proposition to make clocks and watches on the divisional system, as stated under my first division.

It may appear from this, that I am proposing, or have already adopted, a plan which contradicts my own object, namely, not to use expensive machine tools. I admit that this objection may be urged, but my answer is, I have no escape from it, because no simpler mode, that is perfect at the same time, exists, or is at our command; while a tool to accomplish this is not only needful but a necessity, for designs and drawings have thus far lost their full importance, because no certain means of transferring has existed. It is true in Switzerland the pentograph is used, but those who are acquainted with this instrument will know that it is not one of certainty, while a duplicate on a large scale is always required. By the other method referred to, instruction, calculations, and drawings will acquire greater value, because they can be directly and absolutely transferred or applied without that process being merely one of approximation.

What I have stated on this point may likewise seem to contradict my previous statement, that manufacturing was not our object, hence it may be desirable to add some additional explanations. That the making of new parts is necessary, and that it is to the interest of students to complete clocks and watches from the tuitional point of view, as well as for their pecuniary interest, I have shown. Such can only be by means of copying or working by a system. Far be it from me to despise any copy, but I despise the process of mere mechanical or parrot-like copying, hence I am driven to the same process, whether it is transfer of a design or a copy. In this sense our method becomes a process identical with manufacturing, and manufacturing would be the application of the process for reproduction or duplication, which, in our case, is one of exercise, just as at a school the process of accounts are adopted for teaching, which, in the counting-house, is one of business.

Since it is a fact, Mr. Hogg left the purchase of any tools at my option, I consider it my duty to that gentleman to state why we are not in possession of machines which perhaps some expected to see.

There are three conditions by which I have been sought to be guided in the selection of any tool; that is, I have asked myself these questions: Is it needful for the work to be done? Will its use facilitate the instruction or will its absence hinder it? And to each of these questions the answer is negative in the case in question.

The wheel-cutting engine, as we now have it, is imperfect, because there is no absolute mode of making a cutter, therefore, while on the one hand we can easily get work done, and as good as a machine that is in the market at present does do it, doing the same work in the school would absorb useful time without conveying a proportionate amount of instruction; for the real instruction lays not in the mere use of a machine, but in the principles on which it works; hence, the real principle of the wheel-cutting machine is not enclosed in itself, but in that which makes the cutter. That things are not what they ought to be here, anyone can see for himself by the wheels of the present; for I saw wheels not many days ago in a watch made in America, which had mere flat-sided notches in place of the rounding. Therefore, on account of the convenience of getting such work done, on account of its present imperfect condition, and with the hope of being able to effect an improvement in it by the aid of the varied and manifold appliances of the machine-room of this Institute, I have decided not to have one until we can purchase or make an efficient one.

I would only add now, that I think a tool can be made that will make a uniform and correct cutter, and that will at the same time shape anything else to any pre-determined design. Such a machine I hope to place at the service of the school before very long.

Before I pass on to the subject under my last heading, I would just add a few secondary explanations connected with the practical section of our school. There are those who may come to receive elementary instruction, and who wish to be guided in the selection of work, as well as in the mode of working, and there are such who have already general practice and experience, and who may wish to perfect or improve themselves in any special section. It is in reference to these last-named that I wish to add these additional explanations.

We are anxious that all students shall profit by the instruction they receive here to the utmost; but this only can be, when such as come for any special object are sufficiently advanced to receive such instruction, so that that instruction is not converted into an elementary purpose. For instance, a young man wishes to learn to put in a balance staff, but has not learnt the way of turning; it would be a long time before he could accomplish this, because he must learn the elementary exercise first. If he were under the impression that all the time he was engaged on a balance staff, he would most likely get disheartened, he would fail to recognize the true conditions, and go away, considering that his case was a failure; hence my reason for clause 22, that is to exclude as far as possible every tendency to a misunderstanding.

If there is a need for such a precaution in sectional work it will be self-evident that it must be still more so in jobbing, for I do not intend any student to bring a job here to make mincemeat of it, and if not of his own, still less so of anybody else's; for apart from the pecuniary side of such an act it would have an unfavourable effect on the student himself. True, it is said, that failures are stepping-stones to success. This holds good of men and women of strong powers of perseverance, but the weak often get disheartened and demoralized, and, like weaker soldiers, fall out of the ranks on their march; therefore, in the interest of all concerned, it will be my duty to see that there is an appropriate relationship between the work and the workman, so that all come off with credit and satisfaction.

The remarks I have to make on clause 21, I will defer till my last heading, because it is more a matter of principle than of actual skill, and will now close my remarks on this subject with a short reference to clause 7.

The same apology as I made further back is due to Mr. Hogg on this point, but on the strength of my experience I thought the method suggested would be better in the long run; it will stimulate a habit of frugality and care—at least the tendency is that way, and remove or minimise all chances of unpleasantness. With this I pass on to my last, namely,

Theoretical Instruction in Relation to Practice.

Theoretical instruction may be simply defined as the "chart of practice;" by it we learn the principles that underlie and subtend practice, and on which the success thereof depends. We have three principal divisions, namely —preparatory, technology and drawing.

I desire to state here, that had it not been for Mr. Hogg starting this School, I should have withdrawn from teaching, and for this reason. By the advice or request of the British Horological Institute (according to their own showing) the programme of the City and Guilds Institute has been spread over a larger field—so that, to be prepared for any question that may be asked, the instruction must extend over such a large area that it is now hardly possible to provide for it by one course, with any result sufficient to pay the teacher for his time.

But that which works so unfavourably for me or any other teacher under the same circumstances, directly favours them—they managed to get the field covered by their four classes, so I had simply to compete with four teachers. I leave it entirely to you to draw what inference you please on this matter. Now, however, thanks to Mr. Hogg, the conditions are changed, and we can hope for better results. Instead of having but one short evening, we have one for preparing for the ordinary class, so that in this we can get acquainted with the principles which we require to know, in order to understand their application in purely technical subjects, so also in preparation for the subjects in the honours class. So thus we have more time at command to devote to the preparation of the City and Guilds of London Institute Examination. But I have another reason for this arrangement. I anticipate some of the class students to be already acquainted, or they are attending separate classes where the instruction covers that set forth in clause 26, and perhaps also that set forth in clause 27. Therefore, unless I separated the abstract from the technical, such would either have been compelled only partly to use the ordinary or advanced instruction, or else go over the same ground twice, which in either case would have been a sacrifice of time. It is desirable to have students in a theoretical class as near one another as possible in efficiency, that is, at starting, in order that they may work together harmoniously. This object is reached by this arrangement, hence any student who is acquainted with the subject matter set forth in clauses 26 and 27 can at once join the classes the syllabus of which is set forth in clauses 24 or 25.

Students who cannot join both the technical and corresponding preraratory class, had better join the latter one year and the former another, for they would find it no advantage to enter the technical without having gone through the preparatory first. The drawing is open and suitable to all students, and I hope all will join it; in relation to the technical classes, it will show the graphical representations of principles taught there, and in relation to the practical classes, the graphical representations of designs and plans of sections or complete systems of mechanism, and although students can suit their convenience whether they join one or all, while we shall endeavour to make each subject as complete as possible, we shall maintain a relative connection, and seek to make them subservient to one another.

That drawing is essential to working, is now so generally acknowledged that it is needless to offer any proof, it is, however, not quite so readily admitted that the knowledge of fundamental principles is of equal or any value.

A brief consideration of clause 21 will show that the items set forth there, are of leading importance. That these are the very essence of watch and clock making, cannot be challenged, yet it is here that drawing seems useless. Is it then, that we are left without any aid—that we have to grope in the dark up the last steps of the ladder?

No doubt many are and have done so. Just one or two illustrations:—

There have been essays written on the balance and balance spring, and upwards of £200 paid for these essays, and how far can it be said that the trade has profited by them, and why? there are several reasons—and these are the points of my illustration. In the motion of a balance and escapement, we have a number of forces at work, the effects of which depend on variable and relative conditions, hence, if we draw certain conclusions from one set of conditions and apply them to another—parallel on the surface but quite different in their principles, we must be disappointed in our expectations as to results. For instance, in two watches, equal in every respect but their size of balance, you must have a greater loss of time in the shorter arcs of the smaller one, than in the larger, hence require a larger range of isochronal adjustment. If now a man takes up an essay and simply reads the instruction as to the manner in which a spring is to be pinned in, he may have totally different results to what he expected. Thus, men who have relied on these workshop receipts only, have become bewildered and disheartened, and the instructions on which they acted have been discredited, and prejudice has taken possession of their mind against theory in any form. Now we learn from this, that conclusions about a phenomenon, unless we are in possession of the knowledge of all the principles and conditions involved, are totally unreliable.

If we go a step further and add principles to the phenomena, we are scarce any more forward. With a full knowledge of these principles (and in order to understand these) we must understand the language in which such information can be communicated to us. That a separate language, or terms, if you please, is necessary, we can learn from the usage of our own trade. We are familiar with the names which represent different parts and conditions of watches and clocks; if we go to any one outside our trade and speak to them of such things, it is Greek to them. Thus in order that these principles can be communicated and received, we must have a common conception of the terms by which things are represented, and for such purpose we require the acquaintance with elementary principles in geometry, arithmetic, and mechanics, and the conditions of their combinations.

Practice, in its true sense, is like a three-legged stool. Knowledge of principles involved, skill in representing them in solid material, and experience to know when all conditions necessary for success are satisfied, represent the legs, conclusions the seat; hence, as it rests on one or more legs will a man who trusts to it sit firm or come to the ground?

The class of which clause 21 gives the syllabus has directly to do with conditions from which my illustration is taken. I shall try to make it a three-legged stool as far as possible, that is, in order that young men, who may please to join it, may gain as much advantage from it as possible.

I shall try and explain the results we may obtain as far as it can be done by popular terms, so this class is in a sense complete in itself as possible, though fully it cannot be without attending the classes under clause 24 and 25. And further, I not only intend to notice the result of present experiments, but to keep records of performances of clocks and watches after they are away from here.

For this purpose I ask the co-operation of each, then in turn each will obtain the benefit of the collective observations.

For instance, we have here a common acquaintance of the general conditions of a watch or clock, and the mode of its performance; after it is removed, one or the other of the students will have the opportunity of continuing his observations—if he places the record of his observations at the service of the class, we shall have material at our command that must prove of great value to all.

I have only now to say that if there is any point I have not touched upon, I shall be pleased to supplement it, if it is put to me as a question, and add, in conclusion, that though I shall endeavour to make separate class attendance as profitable as possible—yet if you want to do well, attend all theoretical classes in connection with such a practical one as may suit your state of practice. To this I would add my assurance that it shall be my endeavour that all who will become connected with this School may find it a firm three-legged school and that not one may come to the ground.

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The Kew Observatory.

RICHMOND, SURREY.

THE WATCH-RATING DEPARTMENT IS NOW OPENED.

Full particulars as to Regulations, Fees, Certificates, and Rate-Statements, post free on application to the Superintendent.

New Inventions.

ELECTRIC HAND TOOLS FOR THE USE OF MANUFACTURING JEWELLERS, &c.,

Invented and Patented by T. H. Seymour Hawker, and J. W. Salaman, *of Birmingham.*

This invention consists of a hand tool or apparatus containing or forming an electro-motor, which is put into operation by a battery or other suitable generator placed at a convenient distance from the Operator and connected by insulated wires to the said electro-motor. From this apparatus a tool or tools project, varying with the nature of the work to be performed, and interchangeably attached to a rod or bar, or to rods or bars, to which a crank or eccentric on the rotating spindle of the electro-motor imparts a reciprocating motion; or a rotary as well as a reciprocating motion may be imparted, or a simple rotary motion may be obtained by attaching a tool or tools to the rotating spindle of the electro-motor. When a reciprocating rod is employed it is constructed in two pieces connected by a spiral spring which is thus interposed between the tool-holder and that portion of the rod to which the reciprocating motion is directly imparted; this provides against the stoppage of the motor upon the tool being subjected to undue pressure.

It is obvious that various forms of electro-motors may be employed; but it is preferable to embody in the construction of the apparatus the following arrangement of electro-motor as being particularly suitable.

The electro-motor consists of an iron armature in the form of a disc mounted on a spindle and carrying on one or both surfaces a series of iron cores in a crown around the margin and having their axes parallel to that of the said spindle. The cores carry small reels of wire wound alternately in opposite directions and connected to a common polechanger or commutator so as to change the polarity induced in the cores by any current of electricity entering at the spring contacts at intervals suitable for obtaining continuous motion with a bipolar or multipolar field. In the case of a multipolar field the inductors consist of a similar crown of coils fixed opposite and concentric with the armature, with the core ends facing each other. The commutator is constructed with segments double in number to the armature and field coils, so as to reverse armature polarity each time the neutral position is attained, on the well known general principle of electro-motors.

This electric tool or apparatus is either provided with a handle, or is so constructed as to be conveniently held in the hand of the operator who directs the tool or tools upon the work to be treated; and by its use a variety of operations can be performed, and various ornamental surfaces can be produced with very advantageous expedition as compared with hand labour.

IMPROVEMENTS IN WATCHES.

Patented by W. Williams, *Bury.*

The object of this invention is to make a watch to register a distinct eighth, tenth, or twelfth part of a second for timing races, counting the revolutions of machinery, and for other purposes.

"I employ," says the inventor, "between the fourth wheel and the escapement pinion an intermediate wheel, and it is by the division of the teeth and pinions on these wheels that the desired number of beats is determined. For instance, if I want a watch to beat twelve times in a second, I have forty teeth in the intermediate wheel and ten teeth on its pinion, while on the escapement wheel I have twelve teeth and eight teeth on its pinion. For a watch to beat ten times in a second I have forty teeth on the intermediate wheel, with ten teeth on its pinion, and an escapement wheel of ten teeth with eight teeth on its pinion. For a watch to beat eight times in a second I use an intermediate wheel of forty teeth with ten teeth on its pinion, and an escapment wheel of eight teeth with a pinion likewise of eight teeth. In all the above cases the fourth wheel has sixty teeth. The fourth wheel is placed in its usual position, and gears into the pinion of, and thereby drives, the intermediate wheel, which in its turn gears into the pinion of the escapement wheel and gives it motion.

"The dials are painted each to agree with whatever beat the watch is made to mark, thus for a watch timed to beat the twelfth part of a second the dial is marked for 720 beats for the hand going once round in a minute, while the small hand shows a distinct twelfth part of a second. For a watch to show ten beats in a second the dial is marked for 600 beats, while the small hand shows a distinct tenth of a second. For a watch to beat the eighth part of a second the dial is marked for 480 beats while the small finger shows a distinct eighth of a second.

"Although I have above described the best mode I am acquainted with of carrying my intention into practice, I am aware that similar results may be obtained by different arrangements of the teeth of the wheels and pinions but not with equal advantages to those described.

"The ordinary stop motion is applied to my watches, and by its means I am enabled to stop and start a watch at any eighth, tenth, or twelfth part of a second according to the make of the watch."

IMPROVEMENTS IN WATCHES.

Patented by Frederick Fitt, *Chaux-de-Fonds* (*Switzerland*).

This invention relates to detachable watch escapements, and consists in a novel construction of the same, whereby the escapement may be applied or removed without difficulty or loss of time, and in which the act of disconnecting the escapement bed or plate from the watch frame also causes the centre wheel to be locked, and thus prevents the unwinding of the spring.

The present invention is designed to simplify and perfect the construction, and to enable any form or pattern of escapement to be used and of any height or thickness required without unduly increasing the thickness of the watch.

In carrying the said invention into practice the pillar plato is formed with an opening at that point over which the escapement is placed, one end being bevelled. This opening is to receive the bottom plato or bed, of the escapement platform, said bottom plate or bracket extending below the body of the platform for the purpose of entering or passing through said recess to secure and steady the plate in place, and to give room for the necessary or desired length of escape and balance wheel spindles or shafts, and other parts, without unduly increasing the thickness of the watch.

The lower plate or bed carries the bearings of the escape and balance wheels, escape lever, and other parts, while a balance cock, and arms or supports are provided to sustain the bearings of the upper ends of said parts as usual. The said plate or bed is furnished with a projecting finger or point at one end, which is designed to engage with the pillar plate, and to assist in holding the escapement platform in place, and the opposite end is bevelled to fit the bevelled end of the opening.

The end having the projecting finger or point is first dropped into and through the opening, and then the escapement platform is moved a short distance longitudinally, causing the said finger or point to engage over the edge of the pillar plate, and just as the limit of movement is reached the bevelled end of the plate or bed falls to the bevelled seat formed for it at the end of the opening. The opening being much smaller than the platform, the latter rests upon the pillar plate at each end and at the side of the opening and thus gets a firm, broad bearing thereon, while being prevented by the close fitting of the bottom plate or bed from shifting around thereon.

For the purpose of locking the escapement platform firmly to the pillar plate a slide is provided having a lateral projection, to enter a recess in the side or edge of the escapement, and thereby to prevent the platform from being raised or lifted up from the pillar plate, upon which the side is mounted, and held by a screw and guide pin.

The slide is furnished with a knob or stud by which to move it back and forth, and has on its under or inner face near its outer end, a pin, which extends through an opening in the pillar plate and projects slightly beyond the face of said plate to bear against the end of a spring, said end being formed with a double incline, so that by moving the pin to one or the other side of the angle of the double incline the pin will be pressed and held in one or the other position. This movement of the pin in the manner stated is occasioned by the movement of the slide in one or the other direction as already mentioned. When the slide is moved inward the lateral wing or projection passes out of the notch, leaving the escapement platform to be raised up and drawn off from the pillar plate.

In order that the watch may not run down and that it may not be necessay to unwind the spring beforo removing the escapement, the slide is furnished at its forward or inner end with a stop pin, which, as the slide is moved inward, enters between the teeth of the centre wheel and locks it against rotation; thus permitting the escapement to be removed without affecting the condition of the spring. When the escapement is restored to its place the slide is drawn out to lock it in position causing the pin to be withdrawn from the teeth of the centre wheel, the wheels of the train and escapement being put into mesh in adjusting the escapement platform to the pillar plate.

The inventor applies a screw having its head slightly rounded, which head forms a bearing for the point or finger, the screw being turned in or out to cause the escapement platform to be drawn down more or less tightly by the point riding upon the head of the screw.

Screws near the end of the escapement platform serve to adjust and steady the same or to prevent its rocking or tipping on the pillar plate.

ELECTRIC CLOCKS.

Patented by Alois Winbauer, *Baden.*

This invention relates to improvements in self-acting electric clocks from the following description of which it will be seen that a clock made in accordance therewith differs from other electric clocks by the fact that for its regular winding up only a weak current (such as generated by one or two Leclanché elements) is required. Moreover, the circuit being closed a very brief time at every winding up of the clock, long duration of the battery is secured. The regular speed of the hour train is perfectly independent of variable strength of the electric current, the whole construction, when compared with that of other electric clocks, is very simple and may be employed, with clocks of every system and size, whatever may be the length of the pendulum.

The construction and operation of this clock is as follows:—

On the shaft of the centre-wheel (minute-wheel), revolves loosely a disc, actuated or propelled by a weight supported on an arm or lever secured to the back of said disc. The weight must be heavy enough to drive the whole hour-train, and the movement it imparts to disc is in the same direction as that of the hands of the clock.

On the front of the disc a pawl is secured which engages a ratchet wheel, that also revolves loosely on the shaft of the minute-wheel with a barrel fastened to it in front. A spiral spring in this barrel transmits the traction exerted upon its outer end, fixed on the barrel side, to the shaft and thereby revolves the same.

When the weight has travelled down far enough to nearly touch a roller inserted in the right arm of a double-armed lever, a pin fixed on the back of the disc bears against one arm of the forked end of a spring and forces this spring aside. In consequence of this displacement of the upper end of the spring, a pin that rested upon the other arm of the forked end of spring of the arm is displaced, and a metallic lever to which it is attached is drawn down by its own gravity and by the tension of a spiral spring attached thereto. This pin engages the fork of the spring, and the metallic lever to which it is attached abuts against a platinum pin fastened to an insulated terminal, that receives one conducting wire of the battery; the second conducting wire leads to the coil of an electromagnet and from this latter to the aforesaid metallic lever, the circuit is closed by the contact between the platinum pin and metallic lever and the said electromagnet attracts its armature.

This armature being fastened to the short arm of the double-armed lever, the longer (right) arm of this lever makes a rapid upward movement and by means of its anti-friction roller throws the weight into its original position. Generally the lever that bears the weight, describes after the stroke of the double-armed lever, an arc of from thirty to forty-five degrees, according to the strength of the current, and pawl glides over five or seven teeth of the ratchet wheel, whose turning backward is prevented by a second pawl or click. In this way the clock is wound up anew for five or seven minutes.

To break the circuit again after the weight has been brought into its upper position, the right or longer arm of double-armed lever bears a screw that passes through a slot of the metallic lever. When the armature is not attracted, the head of this screw is separated from the metallic lever by a small interstice, but as soon as said armature is attracted the right arm of double lever rises and the head of the screw carries the metallic lever upward, thereby breaking the circuit and disengaging the pin from out of the fork of the spring. This spring in consequence thereof, takes its original position, bearing against a steady pin, the pin of the metallic lever again rests upon one end of the spring and the right arm of the double lever sinks down upon its supporting pin.

During the upward motion of the weight, the spring in barrel partly relaxes itself and thereby rotates the shaft.

DEVICES FOR CAUSING STRIKING CLOCKS TO REPEAT.

Invented and Patented by Jules Blot, *of Bourmont, France.*

This invention relates to a spring detent for causing striking clocks to repeat the hour last struck said detent being constructed as follows:

It consists of two arms or levers of suitable shape united by a pin fixed upon the pillar plate of the clock. The first arm or lever is controlled or operated by a pin on a wheel of the clock and held in position by a spring. The movement of this arm or lever is communicated to the second lever above referred to. There is a third arm or lever and on this a pin guided in a slot of the second lever actuates a detent of the striking mechanic's which is of ordinary construction.

When the clock is to strike in the ordinary course this is caused as is usual in clockwork but when the clock is to repeat the end of the second lever is pulled towards one side by suitable means. This brings the wheels which cause the striking back into the suitable position for again striking the hour last struck, a further pull upon the second lever releases the detent and the clock will then repeat.

Jewellery:

ITS HISTORY AND MANUFACTURE PRACTICALLY TREATED AND ILLUSTRATED.*

THE following series of papers are intended to give some instruction as to the manufacture and repair of jewellery as practised at the present day, together with an account of the history of jewellery, from the earliest period to the present time, illustrated with sketches of selected specimens of each period, copied from the articles themselves where accessible, or from some accepted authority. The literature published upon this subject is very scanty, and with the exception of one or two periods is scattered in various works written upon general history or other subjects, or exists as isolated papers in archæological or scientific magazines.

These papers on the historical portion of the subject being necessarily a compilation, we have freely used all such materials as are accessible, giving references to the particular books from which extracts have been made or which have furnished particular ideas. We must, however, acknowledge here as the source of much information upon the subject, the works of M. Castellani, of Rome, and those of Dr. Schleimann, "Troy and its Remains," and "Ancient Mycenæ."

The desire for personal adornment has shown itself as a chtracteristic of mankind in all times and countries, and is one of the first directions in which he exercises his ingenuity. This is plainly seen in the ornaments of savage races in our own day, and in the accounts of the conquest of all new countries; at first these attempts at display are confined to the use of natural objects, such as shells, berries, feathers, and the claws and teeth of animals; amongst the very lowest types of humanity, even bones of animals being thrust through holes made in the cartilage of the ears and nose for the suspension of these ornaments.†

As civilisation progresses so do we see an improvement in the design and make of these articles. One of the first onward steps is invariably the substitution of metal as the material used for this purpose in place of, or in conjunction with, these natural objects; the use of metal necessarily entails some amount of manipulation or workmanship, and the first metal used for that purpose is always gold. That such is the fact is usually taken as proved by the presence of this metal, and the absence of others in the discoveries of very ancient deposits of human workmanship. To my mind this is not conclusive, for it is certain that gold would remain with little, if any, alteration where other metals would disappear entirely. I think it may be taken as a fact that gold is the first metal used by a savage race, for these reasons: First, that it is the metal which is always found in a metallic state, requiring little or no preparation to make available for use; and, secondly, its extreme malleability and ductility, which would enable it to be worked into various forms by the most rude methods and appliances.

Gold has been known and esteemed as precious from the earliest time of which we have any record. It is mentioned in the Old Testament in the Book of Genesis, chap. ii., 10-12, "And a river went out of Eden to water the garden; and from thence it was parted, and became into four heads. The name of the first is Pison: that is it which compasseth the whole land of Havilah, where there is gold; and the gold of that land is good."

The usual forms in which gold is found are nuggets and small grains in various alluvial deposits, and also embedded in a matrix of quartz, which is itself found in the form of veins traversing various kinds of schistose, or slate rocks; it is never absolutely pure, but usually contains a certain proportion of silver, and not unfrequently iron, copper, and small quantities of several other metals.* In the Gougo Soco Mines, in Brazil, an alloy of gold and palladium of a pale yellow colour is sometimes found; and in some parts of Columbia, a somewhat similar mixture is procured, in which the palladium is replaced by another rare metal called rhodium.

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† "Ency. Brit," Vol. 13, Article "Jewellery."

The composition of various specimens of native gold, as obtained from different localities, is given in the following table:—

Experimenter.	Locality.	Gold.	Silver.	Copper.	Iron.
G. Rose	From the Mine of Beresof	93·78	5·94	0·08	—
	From the Mine of Sinarowski Altai	60·08	38·38	0·33	—
Boursingault ..	From the Mine of Santa Rosa	64·93	35·07	—	—
	From Transylvania	64·52	35·48	—	—
	From Ojas-Anchas	84·50	15·50	—	—
D'Arcet	From Rio Sucio	87·94	12·06	—	—
	From Senegal	84·97	10 53	—	—
	From Brazil	94·00	5·85	—	—
T. H. Henry ..	From Anamaboc, Africa.	98.06	1·39	..	0·15
	,, ,, ,,	88·25	11·17	0·10	0·36
	Bathurst, Australia	95·68	3 92	..	0·16
Norrie	,, ,, ...	91·15	8·28	..	0·57

In an account of the articles forming a portion of the Ashantee indemnity we find the following on the quality of the gold used:—†

"The gold in use among the Ashantees of the present day was analysed by Professor Church, of Cirencester, and the average nugget yields—gold, 90·055; silver, 9·940; there is a minute trace of iron, and a very minute trace of copper. The specific gravity of the gold at 16° is 17·55.

"There are two varieties of nuggets, one found in a black, peaty, combustible soil, the other in the red hæmatite earth, which, being used in the moulds to prevent adhesion, gives the rich red appearance still preserved on many of the cast objects." We will return to the account of the manufactured portion of this collection later on.

The first gold jewellery worn by savage races would, no doubt, from what we have previously said concerning the facility with which it could be worked, consist of rough plates of that metal, beaten out of nuggets and strung together to form various ornaments. Then, as their knowledge and means of working it extended, the beaten-out nuggets would be perforated and worn as rings, or in a larger form as bracelets, necklets, or torcs. The flat plates would be ornamented with various beaten or incised patterns. As civilisation increased, other means of working, such as melting and casting, would, no doubt, be discovered, and silver would be added to the materials at their command, together with other substances easily worked, such as amber. The use of alloys of tin and copper to form bronze mark a much later epoch and an advanced stage of human progress; whilst the manufacture of articles from iron brings us to a comparatively recent date in the history of the world. This metal has been used for making jewellery, but under exceptional circumstances, which will be referred to in its proper order.

The history of jewellery, like that of any other product of men's hands and brains, is also to a certain extent the history of his progress from barbarism to civilization; but we think that nothing else, with the exception of perhaps pottery, brings so clearly before us the individuality of each race. The imperishable nature of the material (gold) of which the ornaments of the time that we may fairly call pre-historic were made, has been one of the causes of their preservation through the ages that have passed since they were worn by the inhabitants of those cities whose very name is now a matter of conjecture. Another great cause of their preservation lies in the habit of burying the treasures possessed by a person when living with him or her when dead. This custom was common to all barbarous races in Europe up to a certain period, and would seem to have had its origin in their belief of a material future for the departed. Even among the early nations, of an undoubtedly high state of civilization, the practice was continued, although a modification seems to have been made; for we find that some of the jewellery buried was evidently made for that purpose, and consists of articles of much too slight a make for ordinary use; in this way quantities of ornaments have been preserved for ages, and their recent discovery has enabled us to construct theories of the life of these vanished civilizations. But these deposits of treasure would have been useless had it not been for * "the researches of students of Archæology, which have added a new department to our literature that is rapidly being extended by the numerous discoveries made of late years in various parts of Europe.

"Five-and-twenty years ago the history of Britain began with the Invasion of Julius Cæsar, and the only sources of information as to what went on before that event consisted of a few isolated notices of a most uncertain character. The historian, even then, could merely put before us the impression made upon the Romans by the British at the time of their conquest, as it is preserved to us in the pages of Cæsar, and in the account which Tacitus obtained from his friend Agricola.

"The history of Gaul begins with the founding of Massilia; that of Spain with the establishment of Gades by the Phœnicians; that of Rome is defined by the pages of Livy, just as that of Greece is by the pages of Herodotus; while the civilization of Egypt and Assyria is lost in the mists of a remote antiquity. All the part beyond these limits was enshrouded in a thick darkness, out of which the respective races appear as they happen to be preserved in the record, itself a sign of high civilization, but telling us nothing of the steps by which it was achieved. Now, thanks to the new method of inquiry, 'the speechless past,' as Mr. Palgrave calls it, preceding history is becoming eloquent, and the story of human life, long before there were written records in any part of Europe, is being read in the dwellings dredged up from the bottoms of lakes, or found underneath the surface soil, in caves and tombs, camps, and in various articles of human workmanship that lie scattered over the whole of Europe, from the glaciers of the hills of Norway to the sunny shores of the Mediterranean. We now have before us a picture of the development of civilization and the coming in of new customs and new arts, of the routes also of the ancient commerce by which the culture of the Mediterranean peoples was introduced among the barbarians of Germany, Gaul, and Britain, as well as of the great migrations of which but a small and insignificant part is revealed in history."

(*To be continued.*)

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* "Gold Mining and Assaying." John Arthur Phillips, F.C.S. "The Elements of the Art of Assaying Metals." Translated from the Latin of J. A. Cramer, M.D., by C. Mortimer, M.D., 1764.

† "Notes on Specimens of Wrought Gold forming a Portion of the Ashantee Indemnity." By R. H. Soden Smith, M.A., F.S.A., in the "Archæological Journal," vol. xxxi.

* "The Age of Bronze," *Edinburgh Review*, April, 1878.

Correspondence Column.

MAIN SPRINGS TO ENGLISH GOING BARREL WATCHES.

TO THE EDITOR OF THE "WATCHMAKER, JEWELLER, AND SILVERSMITH."

Sir,—There seems to be a great want of attention on the part of manufacturers to the main springs they are using to Going Barrel Keyless Watches; in this respect; the power of the spring is very much less at the bottom than at the top, for instance, watches will be found to have 1½ turns vibration of the balance when fully wound up, and only a little over a turn after they have run down twenty-four hours; as there are many fairly good gold keyless watches made with cases weighing from 30 to 40 dwts. each, this should not be. I would suggest that manufacturers should test the springs they use with a gauge, and use those only that are properly tapered thinner from the centre to the outside, the taper being of such a quantity as will make the pulling power equal at top and bottom after it is set up by the stop work.

Perhaps some of your correspondents would kindly through your journal inform the trade where such springs can be obtained.

In testing the thickness of two broken main springs taken from two good watches left for new ones, just recently, I found both of the same thickness all along.

I am your obedient servant,

J. D. Fisher.

Lincoln, Oct. 23, 1884.

SILVER PLATE MANUFACTURERS AND CARRIAGE BUILDERS.

TO THE EDITOR OF THE "WATCHMAKER JEWELLER, AND SILVERSMITH."

Sir,—Working silversmiths will have observed, during the last few days, the united action of carriage-builders, masters and men, in the praiseworthy attempt to abolish the impolitic taxation of their trade. A few nights ago, I attended one of their meetings at the Westminster Town Hall, full to overflowing, the body of the hall being filled with working men. I did not hear any of those remarkable arguments used by certain silver-plate manufacturers at St. James's Hall, some years ago, when it was first proposed to abolish the silver duty,—such as that "English carriages were held in high estimation abroad," or, that "as the tax had prevailed for so many years . . . it was not desirable to abolish it." On the contrary, there was but one opinion, "Off with the tax as soon as possible." The "let well alone" argument was not even broached. And I could not but remember the memorable meeting at Clerkenwell-green, when only a few days after working silversmiths had interviewed the Chancellor of the Exchequer, begging him to abolish the silver duty, the same men howled and hooted, and even threatened personal violence to the man (myself) who had endeavoured (at his own expense) to rid his trade of so unjust and impolitic a hindrance to progress. Well, let bygones be bygones; carriage-makers are treating my friend Mr. Hooper better. Let working silversmiths follow the example of working coach-builders, and let us put our shoulders to the wheel together, to get our trade free by April next.

Yours, &c.,

Edward J. Watherston.

Pall Mall East.

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Ancient Gems and Gem Engravings.

By James Prendeville.

(*Continued from page* 48.)

THE great estimation in which these treasures, notwithstanding their extensive diffusion among all orders of the wealthy, were held, may be judged of by the fact, that many of the most illustrious characters deposited their own collections, selected with great care and made at great expense, as precious relics, in public buildings, for the instruction and the gratification of the community. Pompey, after his triumph, placed in the capitol the gems which he found among the treasures of the great king Mithridates. Julius Cæsar, who, according to Suetonius (c. 47), was a great admirer and encourager of the fine arts, and was not prevented by the excitement and occupations of war, or the glare of his victories, from turning his attention to the possession of the rarest and most beautiful specimens of engraved stones, consecrated and gave to the temple of Venus Genetrix, or Venus the Great Mother (it being one of his honours that his primitive ancestor, Æneas, was the son of Venus), his famous cabinet of gems, which he collected with vast care and expense. Marcellus, the son of Octavius, deposited his cabinet in the temple of Apollo; and others made similar dedications.

It has been already stated that engraved gems were frequently worn on seals. The seal of Julius Cæsar had the device of Venus armed with a dart. Augustus, when he assumed the sceptre, used the figure of a sphinx; because, I suppose, the sphinx, which united the human head and the body of a lion, was a symbol of the Divinity, as incorporating beauty with intellectual and physical power. He afterwards changed this device for the head of Alexander the Great, whom he wished to be considered as his prototype; and finally adopted his own image, engraved by Dioscorides. Pompey's seal had a lion holding a sword; which was fully indicative of his generous bravery and military prowess. The seal of Mecænas had the figure of a frog, which, as being an amphibious animal, was truly symbolical of the power of this prime minister by sea and land. Sylla's seal bore the head of Jugurtha; and the jealousy that Marius (who was commander-in-chief in that campaign) felt at this was, according to Plutarch, the original cause of the mortal enmity between these two leaders, which afterwards drained the best blood of Rome and Italy. In the age of Augustus, the genius and the power that acquired and maintained unchecked and boundless dominion over the vast empire of Rome were not negligent to encourage those arts that tended to minister to its luxury and advance its refinement. But with the Roman power fell the Greek and Roman arts alike; and though, after the revival of civilisation and letters in Europe, they have been partially restored, yet they have not hitherto (especially gem-engraving) been brought to their former state of excellence.

Dioscorides was a Grecian artist in the time of Augustus. So high was his reputation, that, as Pyrgoteles alone was allowed to engrave the effigy of Alexander, so he alone had the privilege of engraving the head of Augustus. This was used by the successors of Augustus as the imperial seal. Solon, Evodus, and Scylax were also celebrated artists of the Augustan age.

Although a vast number of these precious relics have, in the fall of those states that practised and encouraged the art, been irretrievably lost, yet a great number have escaped the ravages of time and barbarism, so as to enable us to estimate the perfection of the art, and even (though faintly) the gradations of its improvement. These relics have been better preserved than any other. Their smallness exposed them less to the injuries of *time*. The frequent and different uses to which they were applied, either as symbols of religion, mementos of eminent men, or rewards of merit, in seals, rings, or other ornaments, made them useful; and their exquisite beauty made them valuable: for the natural splendour of the stone, and the additional perfection of the work, presented at one view two objects of admiration. The perfection of gem-engraving in intaglio becomes the more wonderful by contemplating the difficulty of the execution. The operator, in a measure, pursued his work in the dark: he must mainly have trusted to the accuracy with which he formed his plan; the proper adaptation of his tools; and the skill and fidelity with which he guided them. He could not immediately see the effects of his touches, at the time that these touches gave, as it were, life to the stone. He could not judge of the progress he made on the stone but by consulting, almost at every stroke, the impression he made on the wax, or other plastic substance which he was obliged to apply to the stone, in order to test the progress he made. These impressions were almost the only eyes that gave him light to examine his performance. His general conception must have been previously well formed in his mind, and his tools must have been in a suitable condition to obey the guidance of his judgement. The engraver in relief executed his work by the eye, and without the aid of wax; but notwithstanding this real (or perhaps imaginary) advantage, it is generally supposed that it required at least as much labour and skill to engrave in relief as in intaglio.

But the singular perfection of these little pieces was not at all diminished by the difficulty of the execution; for they were, for the most part, in the spirit of the age that drew them forth and perfected them; and not merely evidence of the best state to which the science was brought, but of the zeal and rivalry of the artists and of the general encouragement given to their occupation; while the beauty and value of the stones rendered them not simply articles of luxury and wealth, but often objects of commerce.

These gems are equal in every particular to the finest statutes, and in many particulars to the finest paintings, of antiquity. They possess all the delineations of proportions, all the development of grace, or dignity, or terror, exhibited by the statues; and with all these much of the light and shadow conveyed by the pictures: for it is one of the singular features in these gems, that the nature, colour, varied shades, and peculiar marks of the stone were frequently adapted to the particular character of the subject. Gems preserve a more perfect likeness than medals cast to represent the same subjects. They have descended to us with less alteration than those pieces of metal, which are often worn, and disfigured with rust. The concavity of the engraved stone screens the relief from the corrosion that damages the medal; also from attrition, and consequently from wearing,—for friction can seldom take place upon a figure that is entrenched and interior. The very incision, too, of the instrument that produces the figure of the stone is susceptible of a more beautiful detail than the mould or balance of the minter.

Besides these advantages, engraved gems possess another merit; inasmuch as almost an infinite number of impressions can be taken from them. As in these figured volumes is to be found all that regards the fable or the history, the ceremonies or the exercises, the customs or the habits, of the ancients; and as they enable us, as it were, to see the features and feel the lineaments of those great personages whose characters and actions, as described by the historians and poets of old, have been a source of instruction and pleasure to all ages, the preservation of the original relics, and the diffusion of their models, must ever be an agreeable acquisition to the curious, and a useful acquisition to the learned.

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Hints on Watch Repairing.

A correspondent of the *Allegemeine Journal der Uhrenmacherkunst* repeats the old truism that time is money, and that it is particularly adaptable to watch repairing. With the enormous competition, and the continual lowering of prices, the watch repairer can certainly not afford to lose any time, and we know that he will gladly receive any suggestions which may expedite his work.

The writer supposes that his task is to adjust or repair an ordinary cylinder watch, and this is how he would proceed:—

Take the watch in hand and open the hind cover. A glance is enough to tell us whether the winding square projects beyond the dust cap. Should this be the case, take a sharp shoulder file and file down the square until it is a trifle lower than the dust cap. The danger of breaking off the square need be anticipated only in the hands of a very unskilful person or by the use of a dull file. When this has been corrected, seize the setting square with a pair of tweezers and move it up and down, paying strict attention to the quantity of shake. Open the crystal and repeat the process. If there is too much shake now, then the centre staff touches the glass. If the proportions admit of it, after having removed the minute hand, file the center staff shorter (exactly) in the same manner as was done formerly with the winding square).

Next see whether the moving parts in the case are entirely free, and that the dust cap joint does not press upon or displace the fourth wheel bridge. Next take down the dial, inspect the minute work depthing, see that the barrel cannot touch the latter; that the stop work, as well as the barrel square upon which the male stop sits, do not touch the dial and that no screw projects beyond the plate, or that the minute wheel pin does not stand above the latter. Take the movement out of the case. Observe the position of the barrel to the centre wheel and take down the former. Then examine the escapement, closely inspect it for the purpose of finding defects; also observe the position of the balance spring, inspect the kind of motion of the regulator, and finally loosen the screw of the lower cap jewel to see whether the lower cylinder pivot sufficiently protrudes through the jewel hole.

Take down the cylinder, correct all the defects found in the escapement, lay the balance spring and again examine the vibrations of the escapement. Then take down the centre and third wheels and investigate the depthing of the fourth wheel and scape pinion. When satisfied of its good condition, polish all the damaged and faulty pivots. Then, if it should be necessary, correct aforesaid depthing, after which mount the centre wheel; see that it stands straight, and next regulate the depthing of the centre wheel and third pinion as well as that of the third wheel and fourth pinion. Then improve discovered defects of the barrel, and finally observe its depthing with the center pinion.

Proceed to harden every soft screw, shorten those that are too long, round them, polish the setting square in case it should need it. The screws are best tempered in oil, and that which still adheres to them after they have been withdrawn is to be set ablaze until burned off. This gives them the right temper, and the grinding, for the purpose of annealing, is dispensed with. Then clean the watch. This is done by first placing the plate into the benzine jar, next the bridges, on top the wheels, escapement and other small parts. When withdrawn clean first the escapement, then the wheels, and finally the plate.

When mounting, first return the fourth wheel, then the scape wheel, and after this the third and centre wheels. Mount the centre staff together with canon pinion, and examine whether the running work move free in all positions. Mount the cylinder and finally the barrel. Repairs necessary to the case must be attended to before cleaning, after the parts have been placed in the benzine.

An adjustment or a repair performed according to this method can be made in about six hours by an average workman, and at the same time he can make corrections which might actually be considered superfluous, for instance, the grinding of the lower face of the bridge, etc.

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Jewels and Jewellery.

(*From the "New York Jewellers' Circular."*)

It appears that jewellery in some form or other has been in use from the earliest ages—from the time that Eve adorned her person with an apron of fig leaves, the brain of woman was busy devising means to improve and increase her charms; whether Eve wore any other jewellery we are not informed; whether she tried to further bring her husband under her control by trimming the aforesaid apron with shells from the sea or other ornament is still a problem, but that the earliest form of jewellery for the purpose of personal decoration was in the shape of fantastically shaped shells found in the bed of rivers, etc., there can be no doubt, and among savage tribes they are yet extensively used.

The terms jewels and jewellery, in their strict signification, are applied to precious stones set in gold and silver and worn as personal ornament, but from general usage any article made from the precious metals is classed under the same heading. From the earliest ages, from the savage tribes to highly civilised nations, the taste for jewellery has characterised the human race. From the earliest times, ornaments for the person were among the first subjects for human ingenuity. Shells, dried berries, small perforated stones and feathers of various colours were combined to adorn the head, neck, arms, fingers and toes, while the cartilage of the nose as well as of the ears, was perforated for the suspension of ornaments, and while in the present enlightened age we may smile at the simplicity of these forms of jewellery, yet when the belle of one of those ancient savage tribes received from her lover a necklace of shells, dried berries, small perforated stones, feathers, etc, as a Christmas present, she knew they were all right, she did not have to endure the agony of mind, which modern belles have to endure, till they can run around to the nearest jeweller to find out whether they were genuine, and whether 14 or 18 carat fine.

But the use of the precious metals for jewellery is also of a very remote antiquity, undeniable proofs exist that the ancient nations had developed the art of goldsmithing to a very high degree of perfection. Finger rings were probably the first forms of jewellery made from the precious metals. The use of signet rings as symbols of great respect and authority is mentioned in various parts of the Bible and it would seem as if they were only worn by kings, princes and people of high rank. They were sometimes wholly of metal but frequently the inscription was cut on a stone set in gold or silver. The impression from the signet ring of a monarch gave the force of a royal decree to any instrument to which it was attached; hence the delivery or transfer of it gave the power of using the royal name and created the highest office in the state. In Genesis, chapter 41, we find that Joseph had conferred upon him the royal signet as an insignia of authority. Thus Ahasuerus transferred his authority to Haman. (Book of Esther.) In the tombs of the kings, in Egypt, have been found many specimens of the manufacture of jewellery by that ancient people, some 2,000 years before the Christian era, which show remarkable ingenuity and mastery of the art. They include hammered work, engraved and chased work, the evidence of soldering chains of fine gold wire, closely plaited and very flexible and of remarkably excellent workmanship. There is in South Kensington Museum an Egyptian signet containing 20 pounds of gold. It consists of a massive ring ½ inch in diameter, with an oblong crest; on one side was the name of a king, the successor of Amunoph III., 140 years B.C., on the other a lion, scorpion and crocodile. The Bible and many historians of the Greek speak of this rise of the art of goldsmithing among the old cultured nations. Solomon's Temple glittered in the pride of gold adornment; 666 hundredweights were used for its embellishment. Homer exalts the golden arm of Glaucus and the exquisite inlaid shield of Achilles. Semiramis caused gold and silver statues to be erected, and the greatest of all Greek artists, Phidias, was a goldsmith, who built temples and in them set statues of the gods in hitherto unknown perfection. In Sycion, Samos, Corinth, and Athens most excellent goldsmiths manufactured those vessels, ornaments and masterpieces for which the Romans afterward paid incredible sums and which we marvel at today as the proof of the eminence of the art. The discoveries of Dr. Schlieman at Mayence and Hissarlik, supposed to be the site of ancient Troy, supplied numerous illustrations of the state of the art at the time of the Trojan war, about 1,200 years B.C. The objects found embraced most of the styles of personal ornaments still in use and gave evidence of singular skill and ingenuity in working the gold, and in combining the various parts of the article.

The goldsmith in his production characterised the grade of culture both of his people and age. During the flourishing period of Greece, we find the goldsmith's art upon the highest pinnacle; generally it descended commensurate with the increase of ignorance and wars, and finally the sun of culture sets behind them. Greek, Etruscan and early Roman ornaments of gold and of a date varying from 1,000 years to 100 B.C., have been found of a character which modern gold workers can by their best skill only rival, and hardly, if ever, surpass; while in later Rome, where the conception of the ideal languished and perished, in the viciousness of the emperors and the brutality of the people, the goldsmith finally becomes the panderer simply for the senseless, beautiful lavishness, and his art becomes nothing else than a more and more degenerating imitation of Greek works. To a certain degree this is true of the jewellers' art to-day. Heliogabalus adorned his rooms with gold, only dined from gold plates, filled from massive silver vessels, which he presented to his companions while the hungry multitude stood before his palace crying for bread. He caused gold dust to be strewn in his path in order to show that as the first in Rome he could afford to waste its possession and its blood. But true art had no companionship for such senseless extravagance, and after a night of many centuries the spread of Christianity once more awakened the jewellers' art to some of its former glory.

From the fifth to the eighth centuries of the Christian Era, the Franks, the Anglo-Saxons, and the Celts manufactured jewellery of distinguishing features. Proof exists that the Saxon jewellers and workers in gold and silver were eminent in their art in the reign of Alfred the Great, while the Celtic ornaments found in Scotland and Ireland were, some of them, hammered work with detail in *repoussé*, filled in with amber or rock crystal, not cut, as the art of cutting had not yet been introduced, but highly polished; others were of minute filigree and plated work in combination with niello and enamel. Of mediæval jewellery from the tenth to the thirteenth century very little is known, and rings are the chief specimens yet existing, some of them very massive and elaborate. It is probable that during this time—the time of the Crusaders—wars engaged the attention of the people to such an extent that all the arts, except the art of war, had to suffer. But after this time a reaction again took place, and in the fourteenth, fifteenth, and sixteenth centuries jewellery was worn with more luxury and extravagance than ever. Great prodigality had become customary among the courts of western Europe, and among their noblemen in France, Spain, Germany, and Italy. The elaborate display of personal ornamentation since the days of the crusades proclaimed the high self-estimation entertained by the princes and knights, which was shared by the free and wealthy citizens of the country. Gold was the word; gold was desired by all. The goldsmith had good customers, and his work was the representation of the period. At first he laid more stress on the solidity of his wares, while gradually, when the people became more refined, he became more ambitious, stimulated by the growing culture and refined taste, of producing the most admirable masterpieces. Table service proclaimed the wealth of a family, together with gigantic beakers and drinking cups surfeit of ornamentation in attire, necklaces, rings and spangles. The knights were encased in gold and silver armours, beautifully engraved with the most delicate interlacings of Arabesque or inlaid with gold. This prodigality in dishes and personal ornaments was fully sustained by the sumptuousness in eating and drinking. When Duke Charles the Bold, of Burgundy, in 1473, travelled to the diet at Trier, his suite consisted of 5,000 well-armoured and mounted men. He himself was dressed in a gold dress studded with pearls valued at dols. 2,000,000. He invited the Emperor, Charles V.; and Hans Sachs, the chronicler of the festivity, says that at the dinner entertainment all the dishes were of silver and the beakers and cups were resplendent with jewels and pearls. Four courses were served, the first of which consisted of 14, the second of 12, and the third of 10 costly covers. For the fourth 30 gold vessels were served filled with spices and confectionary; the largest dish was estimated at about 2,000. dols. Berlepsch said that Elector Moritz caused 450 pounds of silver to be manufactured into dishes intended for the marriage of his son, the future king, August of Poland, with a princess of Denmark. King Sigismund of Poland and Sweden in 1606 presented to his bride a dinner set of pure ducat gold 22·6 carats, the cost of the manufacture alone of the water basin with water (for washing hands after meals) was valued at 8,000. dols. The attire of the bridal pair represented a value of 700,000. dols. The king wore fine diamonds estimated at 1,000,000 dols. in his diadem.

(*To be continued.*)

◆

Cleaning Gold Tarnished in Soldering.—It is usually cleaned in dilute sulphuric acid. The pickle is made in about the proportion of one-eighth of an ounce of acid to one ounce of rain-water.

Trade Notes.

The quantity of diamonds exported from Griqualand West in August was 187,810 carats, valued at £235,912.

We learn, says the *Liverpool Journal of Commerce*, that gold has been discovered on a Beconsfield Farm in the division of Berkeley, Griqualand West, but whether in payable quantities has yet to be proved.

Messrs. Francis Barker & Son have succeeded in making a gold charm Aneroid Barometer with chain-attachment about the size of a shilling, which renders it small enough to be worn as an appendage to the watch chain. Hitherto they have only been made with silk attachment, which was very delicate and liable to get out of order. These little charms are very substantial and as reliable as the larger instruments.

Messrs. John Smith & Sons, of Derby, have just erected at Wooton Church, in Bedford, a large new clock. It strikes the hours on a large bell, chimes the ding-dong quarters, and shows time on a copper dial five feet in diameter. It is also fitted up with the latest improvements. The same firm have also enriched the Great Houghton Church, Northampton, by having a large new clock fixed in the tower, which strikes the hours on a large bell, and shows time on two dials each four feet in diameter. It is fitted up with the latest improvements and will doubtless prove of great service to the village.

The correspondent of the *St. Louis Jeweller* gives the following report of a visit to the Illinois Watch Company:—"September 15.—To-day I made a visit to the Illinois Watch Factory, the third largest in the States. The factory employs 1,200 men when working full force, and is now working 500, among whom are many ladies, girls, and boys. The skilled workmen make $5 or $6 per day, while the ladies and younger persons make from $1 to $2, and in some cases even $3, per day. Most of the fine, intricate work is done by the piece, and nearly all the *employés* are observed with strong magnifying glasses, to enable them to count and shape properly the fine pieces of mechanism connected with the faithful timepiece, from its first start, all through the different departments, until it lands in the inspector's room, all ready to receive sentence and be packed away for market. The capacity of this factory is 500 watches per day. Two sizes of watches, No. 8 and No. 18, are now manufactured, and preparations are in progress to make a size between.—No. 16. The watches are sold direct from the factory and from the company's offices in Chicago and New York. The company makes, in its own shops, all the fine machinery used. All the valuable patterns, designs, etc., are kept in an immense fire-proof vault, and a large safe is observed, where the jewels are kept, whose value alone reaches $100,000. It is interesting to visit the different departments where all the fine work is done in detail. One little box contains small screws to the number of 14,000, each size being put up and numbered in separate boxes and bottles. The scales used for weighing these midgets is a curiosity, being the smallest ever used, and weighing as fine as $\frac{186}{1000}$ of a grain, a breath of air turning the dial. They are very valuable, and are kept closely guarded. The matching up process of the jewels is another interesting feature, and is done by weight in a little instrument, all under microscopic examination. To give a description of all seen would require more space than is allotted to your correspondent, so he would advise all visiting Springfield to call on Mr. W. C. Sommers, the affable superintendent on the watch department, and take a look through these extensive works. They were started in 1869, but did not get under full headway until 1872.

On the 6th ulto., at the London Bankruptcy Court, a meeting of the creditors of Messrs. C. Marx and Co., jewellers, of Bond Street and Regent Street, was held, under the presidency of Mr. J. Wreford, assistant official receiver. It will be remembered that the debtor, C. Marx, carried on an extensive business as a jeweller at 62, New Bond Street, and at 92, Regent Street, and having absconded, had a receiving order made against him upon the petition of Messrs. D. and J. Wellby, diamond merchants, of Garrick Street, Covent Garden. Mr. Hurlbatt, who had been appointed special manager, prepared a statement of affairs, showing gross liabilities £40,594 12s. 1d., and a net indebtedness of £30,043 3s. 2d. The assets were put down at £3,461 5s. 9d. The official receiver reported that, pending the meeting of the creditors, Mr. Hurlbatt, accountant, had been appointed special manager of the business. The debtor had been adjudicated bankrupt, and a warrant had been issued for his apprehension. With respect to the goods in the hands of pawnbrokers for advances, amounting to £6,457, the value of the goods had, for the purpose of the statement, been estimated at the amount of the claims. Mr. George Lewis appeared on behalf of the principal Birmingham and London creditors, other creditors being represented by Messrs. H. Reed, Rubenstein, Theodore Lumley, L. Davis and Attenborough. Mr. Lewis said he had obtained a warrant against the bankrupt, and it was in the hands of the police, but at present the efforts to effect an arrest had proved abortive. Directly after another trustee had been appointed, he proposed to obtain another warrant—this for fraudulent bankruptcy, as then he would be able to get the debtor extradited, if arrested on the Continent, which could not be done with the present warrant which was for stealing goods. In answer to a creditor, Mr. Lewis said they had had information the debtor was in or near London; but although careful watch had been kept, they could not find him. Three policemen were on the watch, and 100 woodcuts of Marx had been sent to various places. The debtor having already been adjudged bankrupt, the meeting now unanimously decided to appoint Mr. Hurlbatt the trustee, with the following committee of inspection:—Messrs. J. Wellby, Alexander, H. Bonas, A. Blanckensee (of London and Birmingham), and E. Lezard.

Foreign Items.

In these times of general competition it is well to have a look-out for new markets. Mexico has made much progress of late, and diplomatic relations are being reopened between Great Britain and that country, so that it would be well for our export houses to direct their eyes to Vera Cruz. From a report by the French Vice-Counsel in Vera Cruz we find that the class of goods obtaining the readiest sale is ordinary silver jewellery, and gold of 14 carats and lower standards. The duties and other charges attendant on importation amount altogether to 14½°/o *ad valorem*. The sale for high-class jewellery appears to be limited. For the benefit of our exporters we give the names of the ten leading Mexican houses in the jewellery line:—Gabriel Zivy & Co., Muiron & Co., Lagarrigue & Co., Schreiber & Co., E. Sommer, Schaffer Martin, Laué German, Alexandre Jacot, Valdés & Gonzalez, Thomas Hernandez. Besides the firms already mentioned there are in Vera Cruz—Düring & Co., B. Gutheil & Co., E. Dahlhaus R. Varela & Co., who deal in jewellery in addition to fancy goods.

At Dresden (Saxony) there is at present a technical exhibition. The watch trade is but poorly represented; in fact, the only exhibitor of any importance is Mr. Grossman, of Glashütte.

The French Academy of Fine Arts has awarded the Cambacérès Prize of £40 to Mr. Henry Dubois, cameo cutter and engraver of precious stones.

News from La Plata is not favourable. It appears that the warehouses are more than sufficiently stocked, and prices are low in consequence.

It appears that the gold and silver trades in Paris have been favoured with numerous provincial and foreign orders within this last fortnight. Decorative bronzes are also in good demand, while watches, clocks and optical goods are dull.

The diamond market remains still unsettled. The animation of one week is followed by a lull in the next. The cessation of work in the Kimberley mines has no doubt checked the exportation; but there appear to be large reserves, and buyers are very cautious.

It appears, from statistics just published in a French contemporary that we have always been considerable buyers of jewellery, watches, and clocks in the French Market. Below we give a summary from 1867 to 1881.

	Jewellery and Silverware,	Watches and Clocks.
1867	4,445,020 francs.	4,025,428 francs.
1868	1,743,993 ,,	4,019,066 ,,
1869	2,934,021 ,,	4,846,252 ,,
1870	3,818,803 ,,	2,722,273 ,,
1871	1,263,249 ,,	4,951,088 ,,
1872	2,788,961 ,,	4,357,356 ,,
1873	3,660,920 ,,	4,536,839 ,,
1874	4,682,382 ,,	5,796,643 ,,
1875	1,348,756 ,,	5,737,759 ,,
1876	2,782,092 ,,	6,873,755 ,,
1877	3,187,973 ,,	7,359,877 ,,
1878	1,881,990 ,,	6,579,495 ,,
1879	1,363,968 ,,	5,504,954 ,,
1880	2,296,225 ,,	5,296,138 ,,
1881	2,906,510 ,,	5,938,610 ,,

The importation of imitation jewellery, and plated ware seems to have been gradually declining. We give the figures from 1877 to 1881.

	Imitation Jewellery and Plated Ware.
1877	8,245,360 francs.
1878	9,103,470 ,,
1879	5,408,708 ,,
1880	5,301,932 ,,
1881	4,862,552 ,,

France is also doing an improving trade in the precious metals with Malta and Gibraltar.

Japan seems to be a large consumer of Coral. The exportation from Italy alone to that country amounts to S117,631,80 on a total importation of S150,404.82. Watches, on the contrary, seem to be less in demand, the importation of this article having declined by one-third.

The Bureau of Control at Chaux-de-Fonds hall-marked, during the month of September, 20,029 gold cases, and 3,734 silver ones.

The latest design of the Parisian jewellers is the grape leaf, applied in a variety of articles of jewellery. This is certainly in better taste than beetles and pigs.

Workshop Recipes.

Solder for Aluminum.—The following alloys are recommended for the purpose : 1. Melt 20 parts of aluminum in a suitable crucible, and when in fusion add 80 parts zinc. When the mixture is melted, cover the surface with some tallow, and maintain in quiet fusion for some time, stirring occasionally with an iron rod ; then pour into moulds. 2. Take 15 parts of aluminum and 85 parts zinc, or 12 parts of the former and 88 parts of the latter, or 8 parts of the former and 92 parts of the latter ; prepare all of them as specified for No. 1. The flux recommended consists of 3 parts balsam copaiba, one of Venetian turpentine, and a few drops of lemon juice. The soldering iron is dipped into this mixture.

Aluminum Silver.—This is made by smelting together 1 part of silver with 3 or 4 parts of aluminum, and is very valuable for articles in which one of the main objects is to obtain lightness, such as the instruments used for marine observations. Octants and sextants of this alloy have been received with great favour by practical navigators. Those parts of such instruments which, if made with other metals, would weigh 4 pounds will, when made of the above alloy, only weigh 1 pound. Mechanics like to work this alloy, as it can be turned and filed away, which is not the case with pure aluminum, it being too soft, and, as no doubt all know who have worked this interesting metal, it has the objection-property of sticking to the file.

Aluminum Silver.—The following alloy is said to receive a high lustre and polish : Copper, 70 parts ; nickel, 23 ; aluminum, 7.

To Polish Aluminum.—Emulge equal parts of rum and olive oil, by shaking these liquids together in a bottle. When a burnishing-stone is used the peculiar black streaks first appearing should not cause vexation, since they do not injure the metal in the least, and may be removed with a woollen rag. The object in question may also be brightened in potash lye, in which case, however, care must be taken not to make use of too strong lye. For cleaning purposes benzole has been found best. Objects of aluminum can be electroplated without any difficulty, and a bright white lustre may be imparted to them by passing them successively through a weak bath of hydroflouric acid and aqua fortis. The effect obtained is quite surprising, it is said.

Cold Black Pickle for Brass.—All hitherto known black and grey pickles possess the defect that they give different colours with different copper alloys, while in the case of certain alloys they refuse to act altogether. For instance, carborate of copper, dissolved in ammonia, gives to brass a handsome, dark-grey colour, while it does not in any way attack various other alloys ; therefore it is little suitable for instruments. A dark-grey pickle, which almost indiscriminately stains all copper alloys a handsome grey, resembling in colour the costly platinum, is composed by dissolving 50 grams arsenic in 250 grams hydrochloric acid, and adding to the solution 35 grams chloride of antimony and 35 grams finely pulverised hammer scales. The articles to be pickled are rinsed in a weak, warm soda solution, prior to as well as after immersion, to be followed by continued rinsing in water. The recipe is simple, and has been repeatedly tested with uniformly good results.

Magic Polish for Brass.—Add to sulphuric acid half its bulk of bichromate of potash ; dilute with an equal weight of water, and apply well to the brass ; rinse it well immediately in water, wipe dry, and polish with pulverised rotten stone.

Moulding-Sand for Brass or Iron.—The various kinds of good moulding-sand employed for casting iron or brass have been found to be almost uniform in chemical composition, varying in grain or the aggregate form only. It contains between 93 and 96 parts silex, or grains of sand, and from 4 to 6 parts clay, and a little oxide of iron in each 100 parts. Moulding-sand which contains lime, magnesia, and other oxides of metals is unfit for use, particularly for the casting of iron or brass. Such sand is either too close, will not stand or retain its form, or will permit the metal to boil through its closeness.

To Clean Brass.—The method prescribed for cleaning brass, and in use in all the U.S. arsenals, is claimed to be the best in the world. The plan is to make a mixture of one part common nitric acid and one-half part sulphuric acid in a stone jar, having also ready a pail of fresh water and a box of sawdust. The articles to be treated are dipped into the acid, then thrown into the water, and finally rubbed with sawdust. This immediately changes them to a brilliant colour. If the brass has become greasy, it is first dipped in a strong solution of potash and soda in warm water ; this cuts the grease, so that the acid has free power to act.

Tempering Brass.—Brass is rendered hard by hammering or rolling ; therefore, when you make a thing of brass necessary to be tempered, you must prepare the material before shaping the article. Temper may be drawn from brass by heating it to a cherry red, and then simply plunging it into water, the same as though you were going to temper steel.

Colouring Copper.—To produce a dark-brown colour upon copper, take the white of an egg, beat it into froth. add a little boiled or rain water, and add to this mixture red oxide of iron colour ; rub them well together in a mortar, and sufficiently thick until the colour covers, and may be applied. The copper article is to be pickled and simply washed ; no sand must be used, else the colour adheres badly. The latter is next applied with a brush until it covers the surface ; it is then dried by fire, the article is generally rubbed with a soft rag and red oxide of iron powder, and finally hammered with a hammer with polished face.

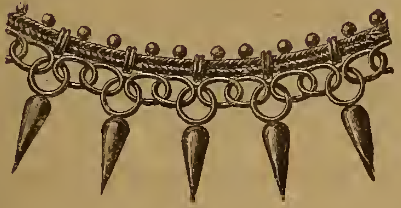
Cleaning Dull Gold.—Dull gold may be cleaned in this way : Take 80 grams calcium hypochlorite, 80 sodium bicarbonate, and 20 sodium chloride, and treat the mixture with 3 litres of distilled water. It must be kept for use in well-corked bottles. Goods to be cleansed are put in a basin and covered with the mixture. After some time they are taken out, washed, rinsed in alcohol, and dried in sawdust. The articles then have the same appearance as if new.

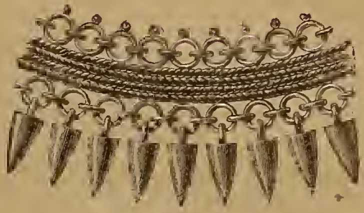
Removing Tin from Gold.—Much depends upon the treatment the tin received in soldering. If it received too much heat, it has penetrated into the gold, and can never be expelled again. This is known when scratching the tin, if it is glass hard it has become incorporated. If, however, it is still soft, scrape it off as closely as possible, and lay the article in a dilute mixture of sulphuric acid and water, and leave it immersed for a few hours. Have a care to have the fluid only strong enough to dissolve the tin, but not to attack the gold. When, after taking out, it should still show black spots, which is a sign that more tin is present, scrape and immerse again.

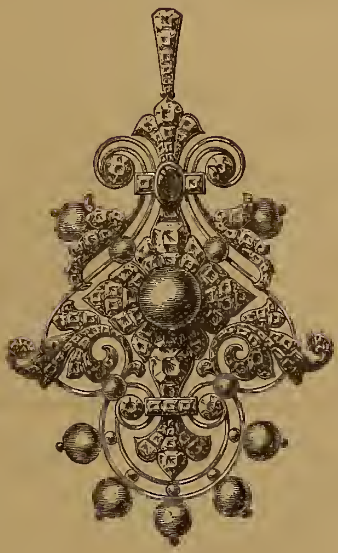
To Separate Gold from Silver.—The alloy is to be melted and poured from a height into a vessel of cold water, to which a rotary motion is imparted. By this means the alloy is reduced to a finely granular condition. The metallic substance is then treated with nitric acid, and gently heated. Nitrate of silver is produced, which can be reduced by any of the known methods ; while metalic gold remains as a black mud, which must be washed and smelted.

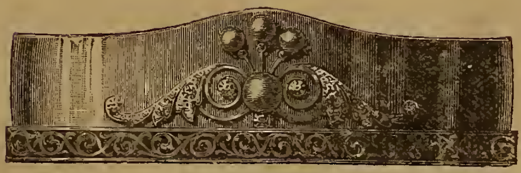
Gold and Silver from Textiles.—Cut into pieces the gold or silver lace, tie it tightly, and boil in soap lye till the size appears diminished ; take the cloth out of the liquid, and, after repeated rinsings of cold water, beat it with a mallet to drive out the alkali. Open the linen, and the pure metal will be found in all its beauty.

MONTHLY SUPPLEMENT OF DESIGNS.









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ILLUSTRATED SUPPLEMENT:—"Designs for Modern Jewellery."

Silver.

By C. Stuart Murray.

> "Hesperus that led
> The starry host, rode brightest, till the moon,
> Rising in clouded majesty, at length
> Apparent queen unveil'd her peerless light,
> And o'er the dark her *silver* mantle threw."

SILVER fitly takes its place beside gold as companion, and one of the most beautiful of metals. Indeed, its pure, white, reflective sheen has won the admiration of all people, and has divided the praise with gold so far as appearance goes. From the earliest period of civilisation, the two metals have in every language been honoured with the prenomen of "precious." The oldest records of the world's history mark a dignified status for silver. The earliest notice that we can find of it is in Genesis xxiii. 15, 16, where mention is made of Abraham buying the field of Machpelah for a burying-place, and in which Sarah, his wife, was buried. Ephron, the seller of the field, speaking to Abraham, says:—

"My lord, hearken unto me: the land is worth four hundred shekels of silver; what is that betwixt me and thee? Bury therefore thy dead. And Abraham hearkened unto Ephron; and Abraham weighed to Ephron the silver which he had named in the audience of the sons of Heth, four hundred shekels of silver current money with the merchant."

As far as our present knowledge goes, this is the earliest reference to *money*, as apart from other values, that is known to the world.

We often meet with the word "shekel" in the Old Testament in relation to monetary transactions. This word is not only the name of a weight, but of a coin. We read that it is derived from the Hebrew word *shakal*, to weigh; that such weight was equal to ten pennyweights English troy-weight; whilst the value is set down at about half-a-crown of our money. Some philologists have ventured, by the transposition of a letter or two, to say that the English word *scale*, has been derived from shekel, whilst in other languages there is *scala*, *scalus*, *skal*, *excale*, a shell, a balance-dish, bowl, shell, fish-scale, and the Dutch have it as *schaal*. Following the matter up, we come upon the fact that Jacob "bought a parcel of a field where he had spread his tent at the hand of the children of Hamor, Shechem's father, for an hundred pieces of money." The prophet Jeremiah bears further testimony to the same method of paying for what had been bought: "And I bought the field of Hanameel, my uncle's son, that was in Anathoth, and weighed him the money, even seventeen shekels of silver. And I subscribed the evidence, and sealed it, and took witnesses, and weighed him the money."

These quotations show the important part that silver played in the purchase transactions of the times of the patriarchs; furthermore, how like are our own ways in that respect to the most ancient practice, *i.e.*, the counting and weighing of coin in our banks, although chiefly confined to gold. We are told that the weights were stones, as the words used for weights commonly signified stones. In a chapter in Deuteronomy, the dealers are cautioned thus: "Thou shalt not have in thy bag divers weights, a great and a small." Job says: "Surely there is a vein for the silver." By vein, *mine* must have been meant; but with regard to stamped coins or pieces, there is no mention whatever that can be taken for a certainty. Some investigators have said that the word *hesitah*, in reference to the pieces of silver, signified a lamb, and that such an image was therefore impressed upon them. Gesenius, however, a very learned author, strongly disputed this, and says that there is no support for the lamb, either in the etymology of the word or in the cognate languages.

Merchants who had to pay and receive the money of the time, were in the practice of carrying the weights and the weighing-scales in a bag, in addition to which they had their large wooden keys for their store-houses slung over their shoulders. The Hobbses of those days must have been a gratified race in having their handicraft thus honoured.

"Gold and silver" are so much coupled in conversation about the "precious metals," that the expression has become a proverb; yet the two metals are very differently distributed in the natural way. Alluvium and drift are the "birth-places" of most of the gold that is found, which was comparatively little, until the great gold-region discoveries, coming from the true veins in rocks. Silver, on the other hand, is found deep in the earth, like coal, and as much above the level of the sea as below it. This seems strange, as it is more plentiful in quantity than gold. An explorer in this direction says, that it has been fancied that while the warmer regions of the earth afford the greatest quantity of gold, the most copious repositories of silver are situated in the colder climates, and either in high latitudes, or in more elevated regions. In support of this idea, it has been affirmed that the most celebrated silver mines of Europe and Asia are placed between fifty and sixty degrees of north latitude, whilst those of Peru and Mexico are within the tropics, but in the centre of the Cordilleras, and in regions of eternal snow. Although the facts mentioned here are somewhat surprising, we cannot accord any scientific character to the view put forth with respect to this distribution.

Gold and silver have a connection that is pretty well known to assayers, as gold in its natural state almost always contains more or less of silver; and we have found in experimenting that silver not unfrequently contains small quantities of gold. Thus, silver from the Ural Mountains contains one-half to three per cent. of gold, and several methods are employed to separate and collect it. It is said that that which is effected by sulphuric acid has been deemed by many to be the most advantageous. In its normal condition, silver has been described as a white, malleable, ductile, and tenacious metal, soft when pure. It is found native, and in the shape of sulphuret, and in combination with several of the metals, especially sulphuret of lead. It may be noted that the lead of commerce, or that which enters into manufactures, is seldom entirely free from traces of silver. Both the native and sulphuret states contain the black and nitrous silver ore.

An enormous quantity of old silver has been treated by the sulphuric acid process, and what little gold there was in it has been extracted. Some years ago, there were in Paris alone, quantities of silver worth two hundred millions of francs annually affined, to use the technical expression, in this way. About the same time very large quantities were also so treated in the Mints of St. Petersburg and other places. As an extraordinary instance of the proverbial thirst for gold, to such an extent was the sulphuric acid method of separation carried, that in Munich the atom of gold contained in the Coburg six-kreutzer pieces was separated and actually made a profit of, although there was only one pound of gold to five thousand pounds of silver! As a six-kreutzer piece would not quite equal twopence English, the amount of gold that it contained must have been very small indeed.

When silver occurs in a pure state in the earth it is found in forms often similar to those exhibited by gold. Those forms are rarely distinct crystals, but mostly present themselves in variously twisted and combined threads, little plates, or moss-like patches, and fragments imbedded in the rock. Capillary pure silver may be found in considerable abundance, filling crevices and little out-of-the-way hollows. From some that have been searched more than twenty pounds of this wire-like silver, in strands several yards long, were extracted. Even stout wires of it are met with, from twelve to sixteen inches in length, and shrub-like masses as much as twelve inches high.

Those who can look through the Catalogue of the Great Exhibition of 1851, will find no fewer than thirty-two specimens of silver ores from the Konigsberg Silver Works of Norway, belonging to the State. These consisted of samples of the silver lode, samples of silver from the stamp-works at Armen, containing about eighty-seven per cent. of fine silver; stamp-ore silver, silver slime, and silver in bar. In the 1862 Exhibition there was no appearance put in from Norway. In the 1851 "Show" there was a magnificent display from Chili, the quantity weighing no less than one hundred and fifty-four pounds. The same country also exhibited a lump of gold ore weighing three hundredweight that was found in a deep mine by a miner, and brought from its native bed. Chili rested from British Exhibitions after that "find." The lump of silver was "quarried" in the year 1850, at a depth of two hundred feet. Its size and weight drew many sight-seers to it; but that was not its chief attraction. It was curiously formed of successive layers, folded one upon the other, as though it had been fused into that fashion, as piles of cloth may be seen. Native silver when dug out is often tarnished, though mostly white in colour, and when newly extracted, it suggests the appearance of small branches of fir. When in its native soil it is, as has been stated, soft, yet much harder than gold; its specific gravity may be roughly taken to be a little over ten and a quarter times that of water. It is found combined with gold, copper, antimony, iron, lead, bismuth, and arsenic, as metals; and with silex and alumina as earths. It is generally mineralised by the muriatic, sulphuric, and carbonic acids, and by sulphur. It is sometimes found in combination with iron pyrites (bisulphuret of iron), and has been worked in this way in Ireland.

The ancients had a system of reducing the ore into the metallic form that was of the rudest description; but it is evident that they were acquainted with the stamping process after their fashion. That would naturally suggest itself upon the discovery of the ore. It was necessary, in order to promote ready smelting, that the ores should be broken up into small fragments, and that could only be done by some kind of stamping or hammering. For those ores that occur in sandy strata that work would be unnecessary. It has been given as a reason that in such cases dry stamping would produce a great deal of loss by dust, whilst wet stamping would cause the same by water. From what we have been enabled to gather about the ancients in this way, the inconvenience and expense of their plan almost outweighed the value of the net result. They reduced the ore to coarse powder by pounding it in mortars, and then ground it in the kind of hand-mills—those which were used for grinding grain, until the powder became so fine as to be easily washed and cleaned. The method was traditional, and it was followed by the Egyptians, Greeks, and Romans; in fact the remains of such mortars and mills as were used have been found in "the works" where smelting and casting have been carried on. According to a French antiquarian those hand-mills were more like our present mustard-mills than any other kind of machine. In washing mud ore a sieve was used for silver; but in gold-laden sand it was a raw hide.

Improvements took place from age to age, the most important being heavy stampers shod with iron. These were worked by an arrangement of cogs which were driven by a water-wheel; the ore being placed in strong troughs of wood lined with iron. When the matter was poor, water was gently run into the troughs, and went out through grated openings in the bottom of the troughs, carrying with it the pounded stuff into a gutter. It was there easily sorted from the mud and other deposit that went with it. As an illustration of the tenacity of old usages, we have learnt that mortars and sieves were used in Germany for metallic mining purposes throughout the whole of the fifteenth century; and afterwards in France, where they can be traced down to 1579. Garrault, in his book on the silver mines of France, published in Paris in 1579, speaks of mills and sieves. This gentleman was the first French writer on mining, and has always been deemed the leading authority for that period. His work is even now very scarce; Gobet, a leading Paris publisher, reprinted it in the first part of the "Ancient Mineralogy of France," in 1879. In the very early times of which we have been speaking, men were not acquainted with the application of water-power to the same extent that we are now, nor with the construction of machinery to which such power could be attached.

At some of the ore-crushing works in Siberia, the machinery has largely to be driven by men or horses, because all the dams and sluices are rendered powerless by the frost during the long winter, as men cannot go on with ice. In the few months of summer, however, the water machinery is used as much as it possibly can be. As far as has been ascertained, regular stamping-mills were invented about the beginning of the sixteenth century, and, as has been indicated, in Germany. It has been supposed that as the first stamping-mills were set to work in Saxony and the Hartz mountains, the introducers of them there were the inventors.

Following this up we discover that in the year 1519 the sifting and wet-stamping processes were established by one Paul Grommeshetter, a native of Schwarz, and on that account were called "the Scharzet" in the mining districts of the country. In the succeeding two years great strides had been made in improvements, and a large stamping-work was erected at Joachimsthal, and there was soon plenty to do. A considerable saving had been effected by the new machinery, both in the quantity of ore washed and in the retention of particles of silver that would formerly have been washed away with the mud, and have gone to make mortar for building purposes. In 1525 another mining washer set up what is known as the wet method of stamping, and by his employment of it the grinding of ore became unnecessary. Improvement upon improvement followed quickly, until the wet method upon that system has been brought to perfection.

(*To be continued.*)

Optics.

THE history of Astronomy, the most perfect and the sublimest of all the sciences, has unavoidably extended itself to a considerable length. Optics is the next science in point of perfection. Like astronomy, it depends on observation, but is everywhere capable of the rigid application of mathematical calculation.

As light propagates itself in straight lines, it seems to offer itself spontaneously to the consideration of geometers. Euclid, accordingly, began the investigation at least fifty years before Archimedes had placed mechanics among the number of the mathematical sciences. Euclid only established two particulars:—(1.) That a point in any object is seen in the direction of a straight line from the eye to that object. (2.) That when a point in an object is seen by reflection from a polished surface, the lines drawn from the eye and from the object to the point whence the reflection is made, are equally inclined to the reflecting surface. From a treatise on Optics by Ptolemy, discovered some years ago in the King of France's library, it appears that many observations had been made on refraction, though the law followed had not been discovered.

About 1,000 years after Ptolemy, or in the eleventh century, Alhazen wrote his treatise on Optics. In it he solved a problem of very great difficulty, to find the point in a spherical speculum at which a ray coming from one given point shall be reflected at another given point. Alhazen was acquainted with the anatomy of the eye, though he did not fully understand the uses of the different parts. On seeing single with two eyes he made the very important remark, that when corresponding parts of the retina are affected we perceive but one image. Roger Bacon, who lived in the thirteenth century, made a near approach to the knowledge of lenses, and their use in assisting vision. The date of the discovery of spectacles for assisting the sight may be carried back as far as 1313, but no farther. The inventor appears to have been a Florentine, called Salvino degl'Armatto. He was of a patrician family. Maria Manni quotes the following inscription on his tomb from an antiquarian author:—"Qui diace (giace) Salvino d'Armato degl' Armati Firenze invento de egl' Occhiali, anno MCCCXVII."

Two centuries later Mamolicus appeared. He was acquainted with the crystalline lens of the eye, and formed a correct judgment of the defects of "short-sighted" and "long-sighted" eyes. Baptisto Porta, a Neapolitan, invented the "camera obscura" about the year 1560. The light was admitted through a small hole in the window-shutter of a dark room, and gave an inverted picture of the objects from which it proceeded on the opposite wall. A lens was not employed in the first construction of this apparatus, but afterwards used; and Porta went so far as to consider how the effect might be produced without inversion.

Kepler was the first person who explained the mechanical action of the eye in vision. He perceived the exact resemblance of this organ to the camera obscura, the rays entering the pupil being collected by a crystalline lens and the other humours of the eye into foci which paint on the retina the inverted images of external objects. The mind perceives these images, and refers them at the same time to things without.

Antonio à Dominis, Archbishop of Spalatro, was the first person who explained the production of the rainbow. Having placed a bottle of water opposite to the sun and a little above his eye, he saw a beam of light issue from the under side of the bottle, which acquired different colours in the same order and with the same brilliancy as the rainbow, when the bottle was a little raised or depressed. From comparing all the circumstances he perceived that the rays had entered the bottle, and that after two refractions from the convex part, and a reflection from the concave, they returned to the eye tinged with different colours, according to the angle at which the ray had entered. The book containing this discovery was published in 1611.

The telescope was invented about this time, but somewhat earlier. The honour of the discovery belongs to Middleburg, in Zealand. Two different workmen, Zacharia Jans and Johns Sapprey, have each testimonies in their favour, between which it is difficult to decide. The former goes back to 1590, the latter comes down to 1610. Zachariah Jans was an optician in Middleburg, and Borel has published a letter from his son, assigning 1590 as the date of the invention, and another from his sister, assigning 1610 as the date. From the account of Borel it would appear that Jans was the real inventor, and that the discovery of the telescope had been preceded by that of the microscope. News of this discovery was communicated to Galileo in 1610. He immediately constructed a telescope, turned it to the heavens, and made the interesting discoveries already known.

The theory of the telescope required that the law of refraction should be discovered. This discovery was the work of Snellius, a mathematician of the Low Countries. To express this law he supposed a perpendicular to the refracting surface, at the point where the refraction is made, and also another line parallel to this perpendicular at any given distance from it. The refracted ray, as it proceeds, will meet this parallel, and the incident ray is supposed to be produced till it do so likewise. Now the general truth which Snellius found to hold, whatever was the position of the incident ray, is that the segments of the refracted ray and of the incident ray, intercepted by these parallels, had always the same ratio to each other.

In the triangle formed by the two segments of the rays, and by the parallel which they intersect, the said segments have the same ratio with the sines of the opposite angles; that is, with the sines of the angles of incidence and refraction. The law, therefore, comes to this, that in the refraction of light by the same mediums, the sine of the angle of incidence has to the sine of the angle of refraction always the same ratio. It was first stated in this way by Descartes in his "Dioptrics," in 1637. But Snellius' law, which comes to the same thing, had been publicly taught in his lectures by Professor Hortensius, and must therefore have been known to Descartes.

Descartes next entered upon an inquiry, in which he was successful. In ordinary cases of refraction by spherical and other surfaces, the rays are not collected into one point, but have their foci spread over a certain surface, the sections of which are the curves called caustic curves. The focus of opticians is only a point in this surface, where the rays are more condensed, and of course the illumination more intense than in other parts of it. But if refraction is to be employed either to produce heat or light, it would be a great advantage to have all the rays which come from the same point of an object united accurately after refraction, in the same point of the image. This led Descartes to inquire into the figure which the superficies separating two transparent media of different refracting powers must have, that all the rays diverging from a given point might, by refraction at the said superficies, be made to converge to another given point. He showed that curves proper for generating such superficies by revolution have also two given points, from which, if straight lines be drawn to any point in the curve, the one of these, plus or minus, that which has a given ratio to the other, is equal to a given line. When the given ratio is one of equality, the curve is a conic section, and the two points its foci. The curves in general are of the fourth or second order, and have been distinguished by the name of the ovals of Descartes.

But no practical advantage has resulted from this investigation. The mechanical difficulties of working a surface into any figure but a spherical one are so great that they have never been overcome.

The next improver of optics was James Gregory, whose "Optica Promotor" appeared in 1663. It contained an account of his reflecting telescope. The imperfection of the images formed by spherical lenses led him to substitute reflection for refraction in the construction of the telescope. Gregory thought it necessary that the specula should have a parabolic figure, and the execution proved so difficult that the instrument during his lifetime was never brought to any perfection. After his death the specula were constructed of the ordinary spherical form, and the Gregorian telescope, till the time of Herschell, was more in use than the Newtonian. It is curious that though the Optics of Descartes had been published twenty-five years, Gregory was ignorant of the law of refraction, and found it out by his own unassisted exertions.

Barrow's lectures on optics, delivered at Cambridge in 1668, treated of all the more difficult questions which had occurred in the then state of the science, with the acuteness and depth which are found in all his writings.

About this time the Jesuit Grimaldi made known some optical phenomena which had hitherto escaped detection. Having stretched a hair across a sunbeam, admitted through a hole in the window-shutter of a dark chamber, he was surprised to find the shadow much larger than the natural divergence of the rays could have led him to expect. Other facts of the same kind made known the general law of the diffraction or inflection of light, and showed that the rays are acted on by bodies, and turned out of their rectilinear course, even when not in contact, but at a measurable distance from the surface or edges of such bodies. Grimaldi gave an account of these facts in a treatise printed at Bologna in 1665.

The Dioptrics of Huygens, though a posthumous work, was the production of his early youth, and is said to have been a favourite book with Newton himself. It contains a full development of everything relating to the construction of telescopes, particularly in that which concerns the indistinctness arising from the imperfect foci into which rays are invited by spherical lenses. Rules are deducted for constructing telescopes, which, though of different sizes, shall have the same degree of distinctness, etc. Huygens was a practical optician; he constructed telescopes with his own hands, and some of his object glasses were of the enormous focal distance of 130 feet.

His theory of light was communicated to the Academy of Sciences of Paris in 1678, and afterwards published with enlargements in 1690. Light, according to him, consists of certain undulations communicated by luminous bodies to the etherial fluid which fills all space. This fluid is composed of the most subtle matter, is highly elastic, and the undulations are propagated through it with great velocity in spherical superficies, proceeding from a centre. The ingenuity of the theory appears most conspicuous in the explanation which it affords of the constant ratio which subsists between the sines of the angles of incidence and refraction in the same medium. But the happiest application of all is to the explanation of the double refraction of Iceland crystal, or transparent calcareous spar. This crystal has not only the property of refracting light in the common manner of glass, water, and other transparent bodies; but it has also another power of refraction, by which even the rays falling perpendicularly on the surface of the crystal are turned out of their course, so that a double image is formed of all objects seen through these crystals. This property is not confined to calcareous spar, but belongs in a greater or less degree to all substances which are both crystallised and transparent.

The common refraction is explained by Huygens on the supposition that the undulations in the luminous fluid are propagated in the form of spherical waves. The double refraction is explained on the supposition that the undulations of light in passing through the calcareous spar, assume a spheroidal form; and this hypothesis, though it does not apply with the same simplicity as the former, yet admits of such precision that a proportion of the axes of the spheroids may be assigned, which will account for the precise quantity of the extraordinary refraction, and for all phenomena dependent on it, which Huygens had studied with great care, and had reduced to a small number of general facts.

To render the theory of Huygens quite satisfactory, a reason ought to be assigned why the undulations of the luminous fluid are spheroidal in the case of crystals and spherical in all other cases. This would render the generalisation complete. But till a connection is clearly established between the structure of crystallised bodies and the property of double refraction, the theory must remain imperfect.

(To be continued.)

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Guide to Calculate the Value of Gold and Silver after the various Assay Reports.

By H. Bush, Hull.*

Continued from page 64.

Practical Hints, Tables, and Rules, for Alloying the various Gold Standards recognised by the Goldsmiths' Hall, London, and the Provincial Assay Offices.

Or, one ounce of American coin gold $=21\frac{3}{5}$-carat, to be reduced to $14\frac{1}{2}$ carat-gold—

Convert the vulgar fractions of the carats into decimals, viz., $21\frac{3}{5}=21\frac{6}{10}$, and $14\frac{1}{2}=14\frac{5}{10}$, and the difference $=7\frac{1}{10}$, and convert into thousandths by adding three noughts, viz., 71,000 and divide by

145) 71000 ($\cdot489\frac{19}{29}$ oz. of alloy

to be added to one ounce of American coin gold to produce $14\frac{1}{2}$ carat gold.

In case the fractions are a quarter or three quarters of a carat, convert the quarters into hundredths instead of tenths by denominating the quarter $\frac{25}{100}$, and the three-quarters $\frac{75}{100}$ of a carat.

Finally, in order to prevent any errors in determining the quantity of alloy to be added to a *given* quantity of coin gold, it is well to find first of all the quantity of alloy to be added to *one* ounce, and multiply the result by the given quantity, noting down the product; then calculate by the rule given on page 29, and both answers will fully coincide, and may be taken as a mutual proof of each calculation. The same mode of calculation will stand good for alloying from other standard qualities of gold, such as refined gold $=24$-carat 1·000 fine, Spanish doubloons, which are $20\frac{22}{25}$ carat or ·870 fine, or 18-carat stock, by merely taking the difference of the quality of stock to alloy from, and the quality of gold to be prepared, and then proceed as in the previous examples.

The foregoing rules and examples will no doubt fully demonstrate the superiority of the decimal division of the ounce troy over the old denomination of pennyweights and grains, and the best proof of this contention will be manifested by trying to calculate any of the given or similar examples by the pennyweights and grain division instead of the decimal system.

(To be continued.)

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Jewels and Jewellery.

(From the "New York Jewellers' Circular.")

(Continued from page 78.)

Berlepsch relates the almost incredible story that towards the end of the sixteenth century the prodigality in gold and silver vessels was so great in Spain that a man called himself poor if he did not possess at least eight hundred dishes of the noble metal. It is said that many households had as many as 1,200 dozen of heavy plates and 1,000 dishes The treasures of the recently discovered America were utilized in this manner in European luxury. According to the chronicles of Sevilla the Spaniards brought 1,336,000,000 ounces of gold into Spain between the years 1519 and 1617. But as an offset to the luxury of Western Europe, all the arts had retrogressed so far in England that the Barons had not even tinware upon their tables, but drank out of wood or leather vessels, wherefore it was said out of irony that the English got drunk out of their bootshafts.

The goldsmiths of western Europe, above all, the French, sought to commingle with this taste for luxury in dishes and excessive indecency, and combined their productions with voluptuous representations, especially their large drinking cups and goblets. Only to give one instance: Philip the Good of Burgundy caused a female statue of gold to be made from whose breasts issued the wine at table, and a young girl of enamelled gold in nearly the posture of the Venus of the Capitol, a fountain of the purest wine issuing from under her modestly folded hands. Finally the extreme to all this luxury was reached and it was resolved to counteract this senseless dissipation and luxury with extreme laws. The nobles had become impoverished thereby, and they resolved in 1479, at the 28th great tournament held at Wurtzberg to adopt a sumptuary law by which all gold ornament, both in attire and armour, was prohibited; nor were the women excepted. Charles V. in 1530 issued a law forbidding country people from wearing any jewellery whatever; the citizens might wear a gold ring without jewel, of the value of five or six florins (about thirty five carats), and their wives a girdle up to ten florins; merchants' wives one of ten florins; their daughters and unmarried ladies a headdress of ten florins; rich city councillors could sport a ring of fifty florins; noblemen could adorn themselves with a chain of two-hundred florins, and real knights up to four-hundred; counts and gentlemen might expend five-hundred florins therefor, and their spouses as much as six hundred florins. The goldsmiths were prohibited from employing the noble metals uselessly for articles of ornamentation, nor could they sell valuable articles to persons of low degree.

While these laws prevented the common people from wearing jewellery, the noblemen could obtain most anything from Nüremberg, Germany, which had become the rival of Florence in productions of art. Wenzel Jamnitzer in Nüremberg, and Benvenuto Cellini in Florence were the two masters of the art of goldsmithing in the sixteenth century, the former of the two finished works of so delicate a construction that when the breath was blown against a blade of grass made of gold it moved. Many of his works still exist in the art collections of Dresden, Berlin, and Vienna. It was at this time that the art of goldsmithing reached its highest point of development; the goldsmiths of the Italian republics produced work with the use of enamel, niello work and engraving in combination with skilful execution of the human figure and of animal life, producing effects which modern art is not likely to approach much less to rival. But since that time the causes which have led artisanship in all the trades to decline, through the introduction of the factory and machinery systems, have also had a demoralizing influence on the art of goldsmithing. The past century has not given birth to a master who could lay claim to an immortal name by reason of his artistic conception and skill. From the French Revolution, whose influence extended over the whole world, dates the decline of the art. The desire of the working man of that period to equalise all class differences, the lowering of that social culture to the level upon which this equalization, this compensation, was to take place, was characterized by the gold trinket of that time. Those formerly debarred from wearing jewellery, either by laws as mentioned before, or by poverty, now craved it, it being placed nearer their reach, and purchased that quality that could be furnished at a low price, without artistic pretensions and as a cheap bauble. The main question was its gaudy appearance and its cheapness. The middle class citizen and the proud aristocrat who had become impoverished, but still desirous of retaining the ancient distinctions of their class, were satisfied more with the appearance than the real value of the trinket they wore, and the question with the goldsmith became not how much art and skill he could lavish upon it, but how cheaply he could make it. Solid silverware degenerated more and more into sheet silver, and engraving was superseded by stamps and dies. Chemistry, which once had conjured up all the lore of the secret arts in the manufacture of pure gold, now as diligently strove to undermine it by producing spurious gold and silver that would meet the common wants. To substitute gold by some other glitter and gloss, it furnished German silver, Britannia metal, brass, the art of gilding, electro and roll plating, and many other devices to replace the noble metals. Such substitutes found a prodigious market, and, of course, all such things as art in manufacture disappeared. The goldsmith no longer engraved gold in self-conceived artistic designs, but delegated the task to the factory to pander to the low ideal and vulgar tastes of the multitude—to produce it with their presses, dies, and stamps by the dozen. The markets of Paris flooded the world with these inartistic patterns, and they found a ready sale. This degradation in the art of goldsmithing reached its lowest point about twenty years ago. It was brought about by natural causes, the four classes of the world were being released from the bondage of centuries, and cheap jewellery was naturally patronised extensively by them. They had not the money nor the necessary taste to procure such elaborate specimens of art as the noblemen of former centuries, and among the wealthy the tendency had been to invest most of their money in precious stones instead of spending it on gold decorations. These two causes led to the deterioration of the art. Germany, which had led the world in art, then flooded the world with the most abominable trash from its Pforzheim manufacturers. Eight carat gold and filled with lead solder was the distinguishing feature of its manufacture. They flooded the American, Cuban and South American markets, and helped to deprave the taste of the people. France sent a corresponding lot of jewellery throughout the world, and, while not being quite as bad as the German, yet they possessed the art of rolling out their gold so thin that their jewellery would scarcely bear looking at. The United States factories attempted to imitate them, but failed because they could not work with such thin gold as the French. But a reformation began to pass through the art about twenty years ago, emanating from Italy, and caused by the finds in Pompeii. The artistic shapes of these articles again attracted attention to antique styles, and business men found it pay to imitate them. Chased ornaments are again demanded, but while Pforzheim jewellery has almost disappeared from the market yet the prevailing absence of a well-defined style of the nineteenth century is painfully apparent. The many expositions and world's fairs have glaringly established this truth, and a contrast between the old and the new was very unfavourable to the latter. But we are evidently now in a transition period. The demands of the day are too great to return to the slow hand labour of the Etruscan, Louis, Rococo, or any other style of the past centuries though first-class artists were in abundance. But the time will come when some Jamitzer or Cellini shall blend these styles with those of machinery and reduce them to a harmonious whole.

The great centres at the present time of European art are Paris, Vienna, London and Birmingham. Of these Paris takes the lead, having in 1876 about 900 manufacturers and selling goods to the amount of $12,000,000 annually. They have a bureau there, where all new jewellery is chemically tested with great care; 3 grades are allowed by law and are indicated by official stamps. The English have endeavoured to secure a standard of quality for jewellery, in what is known as the Hall-Mark. This stamp has been recognized by law for over 400 years. It was established by the Goldsmiths' Company, one of the 12 Livery Guilds or associations of tradesmen enjoying certain special rights in England under royal charters, granted in the 14th or 15th centuries. It was chartered in 1327 by Edward III. It was invested in 1462 by Edward IV. with the privilege of inspecting and testing all gold and silver wares in the kingdom, with power to punish all offenders concerned in working adulterated gold or silver, and in 1505, Henry VII., they had additional power to compel the trade to bring their work to the Company's hall to be assayed and stamped, and gave the power for ever when it was not standard to utterly condemn the same. This was the origin of the Hall Stamp and has been on the whole an effective protection to purchasers of these goods, and a movement is on foot among American manufacturers to introduce a similar stamp there.

In this country, during the colonial period, the wearing of jewellery was discountenanced in New England and among the Friends of Pennsylvania and New Jersey, by whom, as well as by the Puritans, jewellery was regarded as one of the devices of Satan, and except what was brought from England by wealthy immigrants, little was worn, and there was no demand for its manufacture. In the last century there were a few gold and silversmiths in Boston, New York, and Philadelphia, who made to order only a few smaller articles of jewellery, such as making of guineas and doubloons into beads, finger-rings, watch seals or chains, but the making of jewellery in its variety and on a scale which could be called a manufacture, was not attempted until ten years after the independence of the colonies had been secured. The manufacture of jewellery was commenced at Newark, N.J., in 1790, by Epaphras Hinsdale, on a small scale at first, but with gradual developments till his death in 1810. He was succeeded by an ingenious mechanic, named Taylor, who invented various machines for facilitating its manufacture. The manufacture at Providence, R.I., was begun in 1794 by Nehemiah Dodge, and in 1812, Marchais la Grave, a Frenchman, established the first shop in the city of New York, at 190, William Street; he was the only manufacturing jeweller until 1821, when others appeared upon the scene. Jewellery manufactured in this country as well as in Europe may be classed under four heads:—1. Articles in which gems form the chief part, the gold work serving only as means to carry out the design. 2. Those in which gold is the principal feature, the precious stones being subordinate and for the purpose of decoration. 3. Those in which gold of various degrees of fineness is the material, either hammered or struck from dies in *repoussé*, cast, engraved or chased, or left absolutely plain but highly polished. 4. Filled or plated goods. The gold used in the first three classes is of fineness from 10 to 18 carats. The term carat is applied to the weight used in weighing precious stones, being equal to 4 grains Troy; applied to gold it means so many 24th of pure gold. Thus, gold of 18 carats contains 18 parts of pure gold and 6 parts alloy. The alloy is copper or silver, and the tint of the gold will incline to red or to yellow, as the proportions of the former or the latter are increased. Gold alloyed with a little cadmium gives a greenish tint. An addition of steel gives a gold of gray and by certain proportions a blue colour. Palladium gives a brown colour, and by the employment of these alloys the goldsmith is placed in the position of manufacturing very handsome gold ornaments without the use of enamels or other colourants, by using an underlay of pure yellow or white gold as a backing of the coloured gold. Other effects in colours are by applying the gold to different degrees of heat, but these colours are not lasting. The process of producing Roman or coloured gold, which is probably the only distinctively modern finish we have, is by alloying the gold with copper, and after the article to be coloured is finished, it is dipped for a few minutes in a solution of nitric acid, which eats out the copper on the surface of the article, and leaves only the pure gold visible on the surface and leaves it of a beautiful yellow colour. By constant wear the pure gold will wear off and the alloyed metal will come again to the surface ready to be re-coloured once more. The hardness of gold is greatly dependant upon the amount of alloy. Pure gold is too soft to stand the wear; 18 carat is still very soft and is now used very little in the manufacture of jewellery, excepting for plain rings and watch cases; 14 carat has been proved to be the best, the hardest, and most durable of all alloys and is being almost universally used.

Filled goods were made in Providence very early in the history of the industry there. The pattern or face of the article was stamped out from very thin ribbons of gold of about 18 carat fineness, forming a shell which was filled with solder or pewter, and a back of very inferior gold was soldered on completing the article. The thin shell under well cut dies was susceptible of very tasteful shaping, and the fineness of the gold gave it a very beautiful surface, so that filled jewellery found a ready sale. This method has, however, been almost entirely superseded by a process called roll plating. In this process an ingot of an alloy of copper and brass is made about 20 inches long, 3 wide and $\frac{1}{2}$ inch thick. It is carefully dressed with a file to a perfectly even surface. A plate of gold, $\frac{1}{40}$th of the thickness of the ingot, is laid upon it and brought into close contact with it, by binding it with iron wire, a little of the saturated solution of borax being insinuated around the edges. It is then heated to the degree requisite for a complete adhesion of the metals, and so as not to produce an alloy by melting them; this is the most important point in the whole process. When thus heated the ingot is rolled out into a sheet of the thinness required. This process is known as the English method, as distinguished from the French method which consists in the application of gold or silver leaf to articles of brass, the union of the two metals being effected by heat and burnishing. Another method of gilding a baser metal was by covering the article with an amalgam of gold and mercury, and then volatilizing the mercury. The method now used for depositing one metal upon the other, known as electro-plating, was discovered by W. H. Wollaston, a chemist of London, who coated copper with silver by means of the galvanic battery in 1801. This was only an experiment, however, but in 1837, Thomas Spencer, in Liverpool, and Prof. Jacobi, in St. Petersburg, each of them conducted a series of successful experiments; it was first used in this country in 1842.

(*To be continued.*)

Chronometer Trials at the Royal Observatory, Greenwich, from 1851 to 1870.

THE following exhaustive paper from the pen of Mr. W. B. Crisp, which originally appeared in the *American Horological Journal*, will, without doubt, be of interest to the readers of the WATCHMAKER :—

"We presented a table* called an 'Abstract of Rates of Chronometers on trial for purchase by the Board of Admiralty at the Royal Observatory, Greenwich, 1870.' In addition, we have thought it would interest our readers to give some explanation of the nature of these trials, the causes of the failures that disappoint so many of the competitors, and a general review of the trials of the last thirty years.

"The tests prescribed for these chronometers are about as severe as well can be, but do not transcend the limits of reasonable requirement. The Board of Admiralty does not require that chronometers purchased by them shall be limited to any particular size, style, or manner of construction, nor that they shall possess any special property in their adjustments. *Uniformity of performance*, being the desired results of the various adjustments bestowed on chronometers for the purpose of producing time-keeping qualities, is alone the qualification sought for, and the test administered in the Greenwich Observatory is well calculated to develop any defect in this particular.

"Chronometer makers or dealers are permitted to deposit in the Greenwich Observatory, in charge of the Astronomer Royal, who is the sole arbiter in the decisions made, each a limited number of marine time-keepers on trial for purchase by the Board of Admiralty. The trial usually begins early in January, and continues about twenty-nine weeks. During the cold weather they are exposed to the greatest degree of natural cold possible in that climate; at other times to medium temperatures, while a portion of the period they are placed in an oven in which the heat is created artificially, but rarely exceeding 100° Fahr. It is designed to test them in all the degrees of temperature within the range mentioned. At the end of each week the gain or loss is noted, together with the maximum and minimum readings of the thermometer. These weekly limits of temperature do not, however, necessarily indicate the *average*, to ascertain which recourse is had to a chronometrical thermometer having the balance so constructed that its rate undergoes great changes by small variations of temperature, and its gain or loss during any period, therefore, showing the average temperature, but expressed in seconds of time, instead of degrees of the thermometer.

"A table is first prepared, showing the running of the chronometers for each successive week, that is, *in the order of time*. During the early part of the trial, the temperature is purposely raised from one extreme to the other, then the trial continues through all the medium temperatures, and in the latter part of the term the temperature is considerably raised; while in the last month it is allowed to fall again, as low as the natural condition of the atmosphere will admit. A second table is prepared, in which the rates of the chronometers for each week is shown *in the order of temperature*, which shows more readily what the general and particular effect has been in each case, by the gradual increase of temperature. A third table is then prepared, being an abstract of the first two, and the one we publish, showing for each chronometer in what week it made its 'least weekly sum,' and in an adjoining column, in what week its 'greatest weekly sum' occurred. Another column shows the 'difference between the greatest and least,' and in the next column is shown the 'greatest difference between one week and the next.' The rule for classifying the chronometers is as follows:—

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* A similar table appeared in the WATCHMAKER for October.

"'Multiply the amount in the column headed "greatest difference between one week and the next" by 2, and add the amount in the column headed "difference between the greatest and the least," and the trial number is obtained.' Obviously, the less the trial number, the higher the chronometer stands in the order of excellence; and it is in this manner, solely, that the standing is determined. When the trial is terminated, the Board of Admiralty selects for purchase a certain number of those that stand highest in the list, according to the needs of the service, and instructs the Astronomer Royal to offer the respective owners certain prices for them, considerably higher than could be obtained in the ordinary course of trade; so that the price paid is in the nature of a prize. Of course what is most prized is the honour of heading the list, and the approval of the Admiralty.

"In the manufacture of chronometers, after the highest degree of excellence is secured in the purely mechanical construction, and, as far as the eye can perceive, each part is well adapted to the exercise of its function, and bears a proper relation to every other part, three difficulties arise to defeat the prime object for which they are designed, viz., uniformity of performance. These defects are, *acceleration of the rate*; *imperfect compensation*; and *a want of isochronism.*

"Acceleration of rate is due to an adherent property in a new balance-spring, generally believed to be found in greater degree in springs of high temper. There is considerable difference of opinion among horologists as to the reason for this defect, which shows itself in a steadily increasing rate, lasting from a few weeks to several years.

"Eventually the difficulty ceases to exist, and it is claimed that those chronometers which possess this property when new, generally become the most steady when the acceleration ceases; but, at all events, they appear none the worse for having passed through the ripening process. Acceleration cannot be remedied by putting in soft balance springs, as that produces a worse defect, found in irregular performance. The writer is certain that the spring should be highly tempered, and that this should not *necessarily* cause any material acceleration of the rate; nor, if it does, should it continue through any considerable length of time.

"Our readers will have noticed nearly all the chronometers entered at Greenwich for trial in the year 1870 were described as having some sort of auxiliary compensation; and the same remark applies to every year since 1850, at which time the Board of Admiralty began to publish with the annual report a description of any peculiarity of escapement or balance. It is a well ascertained fact that most chronometers, with the ordinary construction of balance, when adjusted to maintain the same rate in extreme temperatures, say 30° and 100°, go considerably faster in the mean temperature, or 70°, or what is the same thing, whatever the rate of such a chronometer in 70°, it goes slower in either extreme; and this quantity varies from a small fraction of a second to six seconds in some cases, per day. It rarely happens that chronometers with ordinary balances have the contrary property of losing in the mean temperature, and when they do, in very slight degree. Without attempting to go into the reasons for this interesting fact, it is enough for our present purpose to point out that during the last twenty years, certainly, the English makers have been impressed with the importance of overcoming this difficulty of compensation. Several years since, Mr. Charles Frodsham publicly said, in effect, that the man who could invent a balance having all the good qualities of that ordinarily used, and none of the unstable properties of the auxiliary compensation or other of similar design, and which should remedy this one defect 'ought to have a golden feather put in his cap.' Although there have been nearly as many inventions to remedy this defect in the compensation as there have been competitors for the highest honours at Greenwich, yet the problem does not appear positively to have been solved.

"The effect of a proper isochronal adjustment is shown in the maintenance of a uniform rate under varying motive power. If, therefore, this adjustment is not perfect, inasmuch as chronometers usually, in such cases, go faster with a decrease of power, there is a tendency to gain as the oil thickens. This defect is not developed to any great extent in a short trial of twenty-nine weeks. Yet it probably in some cases contributes to failure, as some kinds of oil may slightly change in fluidity with variations of tempera ture, thus causing fluctuations in the extent of the arcs of vibration. The late Mr. John Poole, of London, was probably the best of the English makers. The workmanship on his chronometers was of the highest order, in addition to which his springing was of superior merit; but, undoubtedly, much of his success was due to what he called his auxiliary, though as it was merely a check acting in cold, we could never see just why this name was given to it. His work was very popular with the trade, and many dealers purchased his chronometers, having their names put on the dials, and entered them at these trials, but whatever credit they obtained was due to Mr. Poole, rather than to those whose name they bore. It is only fair to the other competitors to say that his make stood the best chance of being first on the list, as there were sometimes as many as twelve entered in one year by parties who had purchased them from him. Poole's auxiliary was constructed by securing on the outside of the rim of the balance at the point opposite the end of the arm, a small cock, made concentric with the centre of the balance and parallel to the circular rim. Through the end most distant to the arm a set screw passed which nearly touched the rim in medium temperatures. The chronometer was then adjusted to go the same in high and medium temperatures, which threw all the error of compensation on the side of adjustment for cold, that is, lost exceedingly in cold. By the aid of the set-screw, this was remedied, until it corresponded with the adjustment for other temperatures. Probably most of the auxiliaries are on this principle: Dent's, Hartnup's, and Kullberg's balances are on the principle of flat rims, instead of upright, and the arms as well as the rims are laminated. Excepting Poole's, these balances, or any others with auxiliaries, are seldom in the chronometers manufactured for ordinary trade, and the use of them is mainly confined to those instruments made expressly for the Admiralty trials.

"Some of the auxiliaries are constructed to act only in heat. We notice, in 1867, that Webb entered one such, and in all the temperatures up to 81° it was of unusual excellence, but at that point the auxiliary began to act, and so overdid the matter in the temperatures between 81° and 95° that it caused it to rank the fifty-first in the list. It is a curious circumstance that the renowned maker, Jurgensen, never succeeded in rising higher than thirty-first in the list, which perhaps was due to the fact that he clung tenaciously to a gold balance spring, of the merits of which he wrote considerably.

"We close this article, by adding a table, compiled from the annual reports of trials of chronometers at Greenwich, since 1840, showing the names of the successful competitors, and the years in which they respectively stood first in the list. The names are arranged in the order of merit, according to the trial number given by the formula mentioned. An inspection will show that the highest honours have not been monopolised by any particular maker, although Poole heads the list six times, Molyneux three times, and Kullberg, Loseby, Lawson, Birchall, and Fletcher, twice each. It is worthy of note that since 1850 two only of the chronometers had balances of 'ordinary construction,' and they had the peculiarity of a 'slight alteration.'

Year.	Maker.	Trial Number.
1870	M. F. Dent	13·1
1863	J. B. Fletcher	14·0
1867	Sewill	16·2
1868	P. Birchall	16·5
1847	E. J. Massey	16·6
1869	J. B. Fletcher	17·3
1852	Poole	17·6
1854	Poole	17·6
1848	Loseby	17·9
1864	Kullberg	18·6
1865	Webb	18·7
1859	Campbell	19·0
1866	McGregor	19·0
1842	Molyneux	19·2
1840	Molyneux	20·0
1845	Poole	21·0
1843	Molyneux	21·3
1850	Loseby	22·1
*1862	Simpson & Roberts	22·3
1844	Appleton	23·3
1841	Litherland, Davies & Co.	23·7
†1861	McGregor	24·5
1860	P. Birchall	25·3
1858	Blackie	26·7
1846	Hutton	26·9
1853	Lawson	30·2
1855	Lawson	30·2
1849	Eiffe	33·8
†1856	J. Muirhead	36·7
1857	Hornby	38·5
†1851	Lister & Son	39·6 "

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Foreign Items.

Some time ago we announced that instruction on the adjustment of watches of precision was given in Chaux-de-Fonds, in special classes, and now we hear that the Municipality of that town has made another useful step towards fostering its chief industry. With the commencement of this month a bureau of observation will be opened to test watches of every kind, and for the issue of bulletins. For the present, chronometers, however, will still be sent to Neuchatel.

Diamond smuggling to America seems still to be considered a profitable speculation, in spite of the sharp look-out of the police, and the occasional arrest of one of the fraternity. James Graves and his wife were recently detained on the arrival of the steamer "America" in New York. In their possession was found about 15,000 dols. worth of set and unset diamonds. Mrs. Graves was followed to her residence, where still more jewellery was discovered. A package of diamonds was found in a cake of toilet soap. More diamonds were sewn inside of a hat lining, and in a pocket handkerchief, and other lots were sewn inside of the edging of a lady's silk jacket. Graves was arrested and gave bail in the sum of 5,000 dols. A New York despatch states that Graves is a member of the diamond firm of M. Fox & Co., and that the information on which he was arrested was sent by the firm in Amsterdam from whom the diamonds were purchased. A. F.

The Art of Metal-Working.

METAL-WORKING is the elder brother of sculpture, and may almost have ranked as a primitive art. All the early nations were famous for their gold-working; see the account of the golden bowls which Crœsus, the Lydian, gave to the temple at Delphi, the Salic shields of Numa in primitive Rome, the adornments of the tabernacle made by the Israelites in the desert, the beautiful goldwork of the Phœnicians, the exquisite art of the Etruscans, while for the archaic Greek perfection it is enough to read Homer's description of the shield of Achilles. As to the skill of the Trojans themselves, Schlieman's discoveries of the so-called treasure of Priam speak volumes.

The practice of metal-working suffered the same vicissitudes as other arts under the same influence. In the hands of the Byzantines it was made the means of profuse and costly decoration, but the form was always conventional, stiff, and lacking the grace of a free art; the figures crowded but badly grouped and ill-proportioned, the scroll-work rich but heavy in outline, the ideas bound like the hand of the artist to represent only the austere solemnity of a religion which in its horror of paganism eschewed all the pleasures and beauties of human life which pagan life and art had appropriated. Beauty of form and flow of limb were denied them, but richness became their highest aim; to lavish as much money as possible on their basilicas, altars, and sanctuaries, seemed the object of patrons of art from Justinian's reign till the fall of the Eastern Empire.

Between the years 498 and 514 the high altar of the basilica of San Pietro, in Rome, was under Pope Symmachus plated with silver, and all the chalices, candlesticks, etc., for its use were of gold enriched with precious stones.

In Santa Sophia, at Constantinople, the altar stood under an arcade supported by silver pillars, and with an architrave adorned with silver statues and tablets in niello. The altar front was formed of a plate of gold, enriched with precious stones and enamel. The ambo, or pulpit, was covered with a canopy lined with gold and precious stones.

Similar altar-fronts to the one described at Santa Sophia are still extant in Southern Europe—such as the Pala d'Oro, at San Marco, Venice; the silver-gilt altar at Manza, which is covered with scenes from Scripture in *repoussé*; and the similar one at Sant' Ambrogio, in Milan, where the "maestro faber" Wolvinus told the whole story of St. Ambrose in silver reliefs in A.D. 825. All the three are inlaid with coloured enamels and precious stones.

The Pala d'Oro is about ten feet long by six feet nine inches high, and differs from the other two mentioned in the pictures which compose it being inlaid in coloured enamels instead of *repoussé*. There are twenty-seven squares in the inner border alone, each of which contains a scene from Scripture. Every separate figure and morsel of smalto is separated from the surrounding ones by a fine line of filigree gold, so that the effect is more like that of a coloured glass window than a painting in enamel. The dividing lines and open spaces are covered with jewels, pearls, and even cameos, and the centre is divided into forty-three arches and five circular medallions, each of which contains a picture in smalto. There are several larger arches all similarly adorned in the upper part, and a beautifully-chased scroll work, in a double row, forms an outer framework to the whole. The Pala d'Oro was made at Constantinople in A.D. 976.

The account of the golden thrones of the Emperors Arcadius and Theophilus, the latter overshadowed by a tree of gold with golden birds in it, are sufficient to show not only the skill of Byzantine goldsmiths, but the diffused practice of the art in those days.

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* Made by Kullberg. † Made by Poole.

Under the Lombards, gold-working became, like their sculpture and architecture, solid, realistic, and unrefined. The crowns and other treasures of Queen Theodolinda, at Manza, are pure specimens of Lombard gold-work. Of solid inartistic forms, their chief adornments are a few scrolls and dragons incised on the surface, and large uncut precious stones rudely mounted.

In the eleventh and twelfth centuries metal-working, like all other arts, was almost entirely kept alive by the monks. Barbarian invasion and rule had driven this art out of secular life, and, with literature and painting, it secluded itself in the convents. The abbeys of Monte Cassino and Suliaco, of St. Gall in Switzerland, and of Reichenau in Germany, Ely and St. Albans in England, Tours and St. Denis in France, were a few among the ecclesiastic schools of metal-workers, illuminators, and literati.

The monk Theophilus, in his treatise on Art, written in the twelfth century, gives minute directions for gold-working, as well as for niello and enamel (or smolto), showing the diversity of styles practised by those ecclesiastic artists.

To their industry we are indebted for a large number of the pyxes, chalices, crosses, and reliquaries of ancient work which fill English and Continental museums. Perhaps the finest specimens are the candlestick of Gloucester Cathedral, of the twelfth century, now in South Kensington Museum, and the great candlestick of Milan, which is a mixture of Gothic life and Byzantine skill, full of intricate scrolls and numberless figures and animals.

The Gothic artists in Germany were not behind their southern neighbours in the practice of gold-working, and if we may judge from the golden altar front which the Emperor Henry II. gave to the cathedral of Basle about the year 1603, we find that they had a more enlarged style of composition. Here the design is not cut up into numberless little compartments, but the whole front is divided into five bold arches; the centre one contains a figure of Christ, the others of saints; the ornamentation is full of rich scrolls and foliage. Much of the fine Gothic metal-work of this epoch was executed at Hildosheim, in Hanover, where a large school of goldsmiths flourished in the tenth and eleventh centuries. A great number of the fine reliquaries now in church treasuries and museums were produced here. Perhaps the largest pieces of Gothic gold-work of the twelfth century are the shrine which contains the skulls of the three kings at Cologne, and the shrine of Charlemagne at Aix-la-Chapelle, the latter now in the Musée de Cluny, Paris.

Most reliquaries took an architectural type, and were made with arched niches, colonnades, and gable roofs. Even the censers were adorned with towers or pinnacles, and had Gothic windows for perforations.

The Italians of the thirteenth and fourteenth centuries did not, however, confine their talents to ecclesiastic purposes. As we have observed, warfare and religion were equally important to them, and they put the most exquisite skill into the manufacture of their armour. A visit to the museum at the Bargello, in Florence, is sufficient to prove this. It contains some splendid designs in niello and *repoussé* for shields, cuirasses, and helmets, while the most original and artistic imagination is displayed in the varied shapes of sword-hilts. The Florentine custom of laying up the increasing riches of the citizens in a tangible form in their houses was also great encouragement to the goldsmith's talent. Messer Agnolo Pandolfini, who lived in the fourteenth century, and gives us a perfect picture of domestic life and economy at that time, alludes to this custom. He tells his sons that after his marriage he took his bride all over the house, and showed her all his household stores, from the fruit and corn in the attics to the wine and firewood in the cellars, after which he took her in his own chamber, and having locked the door, lest any one should enter, he opened all his wardrobes and cassoni (chests) and showed her his treasures in the shape of tapestries, embroidered robes, silver vessels, and jewels. In a close community like a city republic, this private storing of wealth in the form of plate and jewellery is very usual. The same thing took place in the ancient Greek republics, and Homer's writings give us to understand that that treasures were laid up in the same form in the houses of Troy.

In the earlier days of the Florentine Republic, the industrial arts were considered of so much more importance than the luxurious ones, that neither the goldsmiths nor artists were numbered among the guilds; the former were incorporated in the "Arte della Seta" (guild of silk merchants) and the latter with the "speziali" or apothecaries.

But in the fourteenth century, when increasing wealth encouraged the decorative arts, we find all kinds of artists taking a high standing among the burghers, having their own statutes and rules, and possessing a great influence on society. The goldsmiths were especially potential, their influence changed the style of Florentine art, and is apparent throughout the whole line of fifteenth century painters, from Paolo Uccello to Verrocchio; through them also the arts of engraving and printing were invented—discoveries which changed the whole history of the world.

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The Working Goldsmiths' and Jewellers' Association of Ireland.

(*From a Dublin Correspondent.*)

The inaugural meeting of the above body was held on Friday last, at their rooms in Marlborough Street in this city; Mr. John O'Clohessy presiding.

The rules for the future government of the association and explanatory of its objects, as prepared by the committee appointed for that purpose, were unanimously adopted. One of the rules provides for a benevolent fund in aid of distressed and enfeebled members.

This trade here had its guild or corporation established by royal charter many centuries back, and had its Goldsmiths' Hall in Golden Lane (whence it takes its name), and is at present carried on at the Custom House. Its privileges include the right to assay and stamp all gold and silver articles manufactured in Ireland (there being only three cities in the empire equally privileged); also the right to mulct by heavy fines any persons assuming the style and title of goldsmiths, &c., without being legally entitled thereto. As a consequence of the modern violation of this right by parties having no connection with the trade, the present association has had to adopt the prefix, "Working Goldsmiths," etc., in order that the public should understand their position in trade; and it has been formed on the broadest possible basis, in order the better, not only to promote the individual welfare of its members, but also that which is of vital importance—the extension and development of the trade in Ireland.

For the ensuing twelve months the following officers were elected:—Mr. J. O'Clohessy, President; Mr. Oman, Vice-president; and Mr. Gilmore, Hon. Sec.; with a Committee of seven.

A vote of thanks to the chairman terminated the proceedings.

Correspondence Column.

TO THE EDITOR OF THE "WATCHMAKER, JEWELLER, AND SILVERSMITH."

Sir,—Having in the practice of my profession observed that exhibitors of unpatented inventions at international and industrial exhibitions are not generally aware that their position is affected by certain provisions of the "Patents, Designs, and Trade Marks Act, 1883," I beg to point out, through the medium of your paper, that the six months' protection of unpatented inventions so exhibited is no longer accorded unconditionally, such protection being now obtainable only by compliance with the requirements stated in Section 39 of the above-mentioned Act, and Rule 17 of the "Patents Rules."

Details of the mode of procedure may be obtained from the proper official sources of information, or I will supply information without charge on application.

I am, Sir, your obedient servant,
W. T. Whiteman,
Fellow of the Institute of Patent Agents.

7, Staple Inn, London, W.C.,
21st November, 1884.

TAPERED MAIN-SPRING.

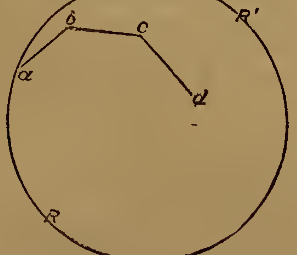
TO THE EDITOR OF THE "WATCHMAKER, JEWELLER, AND SILVERSMITH."

Sir,—There is an old story relating the conversion of a critic. A peasant, stretched out in the cooling shade of an oak, contemplated the apparent want of proportion in the designs of the Creator, for placing such a small fruit on such a majestic tree, while such a splendid appendage as a pumpkin is growing on such a miserable herb. Being disturbed in his contemplations by the descent of an acorn on the terminal part of his respiratory organ, he was led to the reflection as to what might have been the result had the acorn been a pumpkin, and thus to the conclusion, that in this case at least, his improvement would have been a mistake.

Now I repudiate all ideas of any attempt of drawing comparisons between this man of ancient story and your correspondent, Mr. Fisher, but simply introduced it to show that there is a compensatory principle running all through nature, to which I will now add some proofs, that main-springs come under the same law.

Many experiments have been made with the object of equalising the pull of springs, the one in question being one of them, but though it appears to give the desired result, its merit is simply due to coil frictions, and therefore objectionable, because it is inconstant and unreliable.

The old phrase, "What is gained in power is lost in speed," which is but a mode of expressing the compensating principle referred to, and which is represented in mechanics as the principle of virtual velocity, holds good in the main-spring, and assists us to understand its mode of action.



Let *RR'* represent any one coil of a spring placed in a barrel, and let *a b*, *b c*, and *c d* represent small sections of the spring leading-off at *a*.

We may suppose three cases, viz., the spring increasing in thickness from *a* to *d*, or from *d* to *a*, or being equal throughout. Let us consider them in order.

It is evident, that if a force is applied at *b*, and such force is greater than the resistance of the spring, it will bend, and bend at its weakest point first, therefore in the present case at *a*. As the resistance of the spring increases with the angle of inflection, the resistance at *a* will become greater than at some other point between *a* and *b*, when a new centre of inflection is created, and so on. But this holds good for every section from *a* to *d*, for the angle of inflection is inversely proportional to the resistance of the spring.

That what applies to the small section *a b*, applies equally to *a d*, and to the whole spring. Were every section of the spring free to move, the work done of every section would be equal to every other, that is, their several products of force into space in a unit of time would be equal, but when such a spring forms a spiral, we have a new condition of things.

By reason of the greater angle of inflection at *a*, when force is applied at *b*, the outer coils of the spring tend to move inward long before the adjacent ones, therefore their motion is at once checked by the stronger coil. The motion of every section of the spring is a resultant motion, one component of which is radial, and the other at right angles to it, and these components vary inversely as the radial distance of the points of the spring under consideration—that is, with a free spring. With a tapered spring, however, placed in a barrel, the radial component simply exerts pressure against the adjacent coil, which increases and reaches its maximum effect when the spring is wound fully. It is the tangential force of the spring that communicates the motive power, and hence it is less by the amount necessary to overcome frictional resistance created by the pressure of the radial component. Thus it is dependent on the condition of the surfaces in contact, and may vary greatly between one period and another. The conditions are alike in coiling or uncoiling, with one peculiar difference, by winding, the force necessary is greater with coil friction, while the virtual measure of its restitutive force is less. It is this which gives it the appearance of an equaliser of main-spring force.

A spring thinnest at *d* would act just in a reverse manner, hence does away with all hope that such could equalise the virtual pull. For a fusee which depends on other means for this object, it is, however just suited. The outer coils open long before the inside ones, and thus coil friction is minimised to the least possible quantity.

Now, as to a spring of equal thickness, to which Mr. Fisher objects.

The condition, that coil friction may be avoided is, that the radial components of their motion are inversely proportional to the resistance or power of restitution of the individual coils. To this condition a straight or equal spring approximates nearest, with one provision as to the mode of hooking.

With a French hook, or any other that offers no resistance to inflection, the same condition in a measure exists as in a spring first considered; hence, to avoid coil friction as much as possible, an English hooking or brace is necessary, so that resistance to inflection is equal at every point of the spring.

That this is so, can be easily verified. Let any watchmaker examine a spring that has been going for some time with a French hooking, and he will find far more of the blue rubbed off than on another with an English hooking, or especially a brace.

Thus much, then, as to the basis on which this equalisation is affected. That it is utterly unreliable need not be proved to a man of any experience in mechanical action, but unless the isochronal adjustment of a balance spring are almost perfect, this coil friction will prove fatal to time, however much it may appear to answer, for that watch which has constant factors can be regulated or adjusted, but not so the one who has a number of unknown ones, hence I consider the spring of equal thickness, like the acorn "the right thing for the right place."

Yours, etc., J. Herrmann.

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Clerkenwell.

One striking feature of trade is its localisation. History reveals the fact as existing from the remotest ages. Our modern London is no exception to the rule. You require leather—Bermondsey will supply the need; furniture—Finsbury; artificial flowers and ladies' headgear and material—Islington; jewellery, watches, and clocks—Clerkenwell.

Wilderness Row (now Clerkenwell Road) is a remarkable instance of the centralisation of an industry, its growth and importance being a living proof of the old saying, "Birds of a feather flock together." The entire old row of houses, much as they have been altered to suit present requirements, bear some of the original features of the "out of town" residences of well-to-do tradesmen who, a hundred and twenty years ago, desired to have pure air, a country garden, and the quiet not attainable in the busy haunts of the City.

The great and ever increasing demands of expanding London commerce have made a demand for more, and more space. The old Row has been engulfed in the vortex of the "City warehouse area." Private residences have been converted into business *premises;* what was once a pleasant retreat is now a busy hive of industry, nearly every house and every room in its whole line being used for some purpose in connection with watches, clocks, jewellery, optics, or materials connected with each or all of those trades.

Our present purpose is to notice the progress and development of one house of business in the "Row," viz., J. J. Stockall, Nos. 6 and 8. The business was commenced some thirty-five years ago, in Lever Street (then Wellington Street); increasing, larger premises were occupied in King's Square; these proving too small and out of the way, it was moved to the more business-like and accessible spot in Wilderness Row, near Goswell Road. Here, twelve years since, we found it conducted in a little shop and parlour. To the old branches of watch manufacturing and jobbing had been added the sale of tools and materials. Shortly we find the next premises taken, and the stock include Geneva, American, and Coventry watches, a large turn-over evidently in second-hand watches, jewellery, etc.

Now we find the whole ground floor, yard, and back premises opened into a large warehouse, with a wonderful show of every variety of French, gilt, and marble clocks, sets, bronzes, etc., American, German, Swiss, Viennese, and other clocks, English and foreign dials, regulators, tools, materials, too numerous to mention; a showroom on first floor, with an admirable selection of presentation and other clocks and ornaments; the basement and back building converted into store-room; an added floor to top of house into workshop, where some thirty workmen are employed in repairing watches, clocks, etc.; a numerous outdoor staff likewise bringing the best work produced in the peculiar old-fashioned Clerkenwell style in attic, workshop, or bed or living room.

Judging from present appearances, the full purpose of the proprietor is not yet attained; till every requisite required in all branches of the watch, clock, jewellery, and optical trades can be obtained on the premises, he will not be satisfied. The extensive circulation of illustrated catalogues, price lists which have evidently cost a very heavy sum, shows his determination to join in the race for a share in future mercantile transactions. Judging from past experience, he will attain his end and gain his reward.

Jewellery:

ITS HISTORY AND MANUFACTURE PRACTICALLY TREATED AND ILLUSTRATED.[*]

(*Continued from page* 74.)

No treatise on jewellery, ancient or modern, would be complete without some mention of the natural history, if we may so term it, of that metal Silver, which for a great many purposes takes equal rank with gold, though of course not as regards value.

Its uses for jewellery, by which we understand personal ornament, have been in all times great, but in some ages of the world's history its chief use has been for what we call plate, that is, for utensils for domestic use, or for ecclesiastical purposes, and for coins as a medium of exchange, or, as we now say, money. The name we now use for this metal seems to be derived from the Anglo-Saxon *silfor*,[†] whilst in old works on metals and alchemy it is termed Luna, and symbolised by a crescent moon (☽); in modern chemistry it is known by the Latin name of Ag (*argentum*). It is the whitest of metals, and is capable of a high degree of polish; its hardness ranks between gold and copper, and for malleability and ductility it occupies the same position; it may be beaten into leaves 0·00001 of an inch in thickness, and a grain of this metal may be drawn into a wire 400 feet long. The specific gravity of silver ranges from 10·1 to 11·1; it melts readily on charcoal by the use of a blow-pipe, or in a crucible upon a furnace.

Silver when pure and melted exposed to the air absorbs about twenty-two times its bulk of oxygen,[‡] but the presence of a small portion of copper or lead greatly modifies this fact. On solidifying this gas is given off again, so that in silver-casting great care is requisite that the surface of a casting is not cooled too rapidly, or the molten metal in the interior is projected with violence from holes in the surface. This spilling is prevented to a great extent, in a lump in a crucible, by a layer of charcoal powder, whilst the absorption of oxygen is prevented by fusing with common salt. The use of nitre in the crucible encourages the absorption of oxygen gas.

Silver is one of the best conductors of heat, and is the best conductor of electricity. It alloys freely with gold, copper, and several other metals. Silver is found frequently in a pure state in nature, and very abundantly combined with other elements, such as sulphur and chlorine.

Silver is found nearly pure in filiform or aborescent shape, sometimes in masses, but is not so often found in the pure state as gold, nor is it found in placers or alluvial deposits as that metal is.[§] It is usually in irregular, ragged masses, or in thin sheets, coating surfaces of the vein-stone, or filiform, as if drawn out into wire, hence the name wire silver applied to such specimens, whether the filaments are as coarse as a knitting-needle or as fine as a hair.

This wire-like form of silver is of frequent occurrence in the cavities of veins. The filaments sometimes reach the length of a foot or more, but are generally much curled up, or interwoven, or matted together, looking like bunches of hair or wool. It is also frequently found in native copper and galena, but so finely disseminated that it is invisible to the naked eye.

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[*] All rights reserved.

[†] Johnson's "Encyclopædia," New York, 1878.

[‡] Malaguti and Durocher give a table of 122 substances, chiefly mineral species, in which silver has been found by assay. It is found in sea-water in the ratio of one millegramme to 100 kilogrammes. Assuming that there is one centigramme of silver per cubic metre of water, it has been calculated that the oceans of the globe contain not less than 2,000,000 tons of silver. All native gold contains from 1,016 to 16 per cent. of silver, but generally from 5 to 13 per cent. Californian gold averages about 12 per cent.—*Johnson's Encyclopædia.*

[§] Johnson's "Encyc.," "Mineralogy," by Frank Rutley, F.G.S.

At Konigsberg, in Norway, this metal has been found massive and in large and perfect crystals, which retain their white colour without tarnishing in a remarkable degree. One mass taken from these mines and preserved in the Royal Museum at Copenhagen, weighs upwards of 500 lbs.; two other masses weigh respectively 238 lbs. and 436 lbs. Large amounts of native silver have been found in Mexico and South America; one mass in Peru is said to have weighed 800 lbs. Large masses have been reported from the northern portion of the Mexican State of Sonora. It is not uncommon, though not in large masses, in the upper portions of the silver-bearing veins of the western States and territories of the United States. Other localities where silver is found are Cornwall, in England, Freiberg, Schneeberg in Saxony, Schemnitz in Hungary, Mertschinsk in Siberia, Nevada, California, and in the island of Java. It is also found in a vein upon Silver Islet in Lake Superior, and associated with the native copper of the Keweenaw Point mines.

Some of these specimens are remarkable for being completely joined to the copper without any intermingling of the metals, one half of a mass may be silver and the other half copper. Jewellery and ornaments are frequently made by local jewellers, one half being copper and the other half silver, the line of union being sharply defined, while the two metals are perfectly united. Specimens of silver when taken from the mines are usually tarnished of a dull brown colour, or even black, this colour being caused generally by the presence of sulphurous vapour either from the constituents of the vein or the combustion of powder, such vapour rapidly tarnishes. Silver ware and silver-plated goods it is well known, rapidly tarnish and turn black on being exposed to the fumes of bilge-water and the combustion of coal.

(*To be continued.*)

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Waltham Watches.

In our advertisement pages will be found an apology from Lewis Jacobs, pawnbroker and jeweller, of Leather Lane, Holborn, to Messrs. Robbins and Appleton, agents to the American Watch Company. It is satisfactory to notice that Mr. Jacobs has given an undertaking, by way of public apology, that he will not in future entertain the purchase of these fraudulent watches, and that he will assist Messrs. Robbins and Appleton in bringing to justice any persons offering such spurious Walthams in the market.

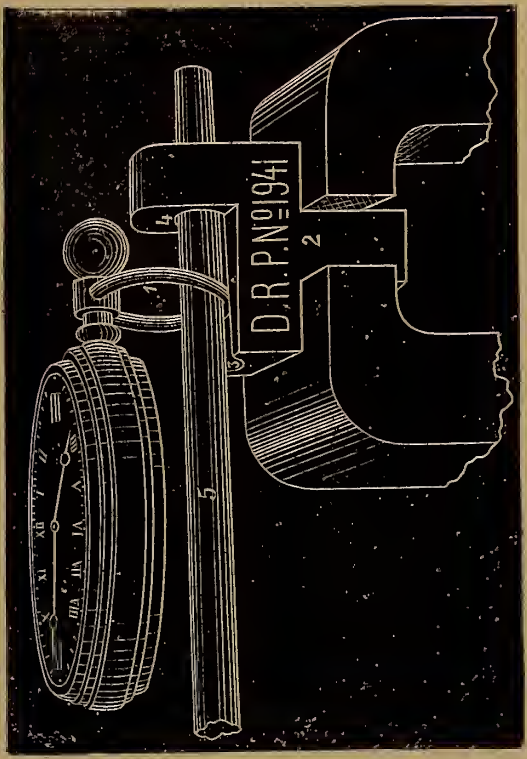
We also learn that the American Watch Company have just obtained judgment against a Parisian firm, who were prominent exhibitors of watches at the Amsterdam Exhibition in 1883, for offering for sale fraudulent watches bearing the Waltham trade mark, but with other names on the plates of the watches. The judgment having been obtained, a search warrant was issued, and the police thoroughly searched the offices and warehouse for all the fraudulent watches. As a word of warning, we would especially caution our readers to guard against any such spurious imitations being offered to them as the genuine "Waltham," as it is only fair to state that the American Watch Company are determined to proceed to the fullest extent of the law in all cases of infringement of their trade mark, both for the protection of their customers and for their own interests.

New Inventions.

TOOL FOR RENEWING OR INCREASING THE CLAMPING POWER OF WATCH BOWS.

Patented by O. Peters.

After enumerating all the evils that this fleshless member of a watch case is heir to, the inventor of the tool shown in the accompanying sketch describes it as follows:—



The whole consists of a kind of metallic anvil, 2, having a depression at 3, which is circular in its vertical, and conical in its horizontal section. The whole can be placed in the vice as shown in the sketch. The one end has a projection 4, with a hole that admits the insertion of a strong piece of round steel.

The tool is used as follows:—

The bow is placed vertical over the hollow at 4, so that the edge of the bow and the section of hollow only touch at the rounded-off edges of the latter. The round steel is placed through both the bow and the hole at 4, and used something like a crow-bar, until the bow tightens on the pendant.

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The Kew Observatory.

RICHMOND, SURREY.

THE WATCH-RATING DEPARTMENT IS NOW OPENED.

Full particulars as to Regulations, Fees, Certificates, and Rate-Statements, post free on application to the Superintendent.

A Jeweller's-Safe.

At a tradesmen's club, which I occasionally attend on Saturday nights as it is held at a City tavern where I have been a customer all my life, a jeweller's shopman related the following curious story.

Some twenty years ago I was with Messrs. Aytine & Caret, the famous jewellers, who had their business premises in Cheapside. They were even then one of the wealthiest firms in London, and the value of their stock of uncut stones was said to be fabulous. One day in conversation with a fellow-assistant, soon after my coming, I happened to ask if the firm had ever been robbed.

"By shoplifters, yes; in a small way and occasionally, the same as others," was the reply, "but I should like to see the burglar that would tackle our safe."

He then described to me the strong-room, where all the stock was kept at night, and I think I have never before or since heard of such an ingenious piece of mechanism. First of all, each tray of goods, as it was lifted from the window or show case, was placed upon a little steel tramway which ran under the counter and slid the cases into the strong room, a dial in the wall registering the number that passed in or out. At seven p.m. an alarum rang and the door of the strong room shut by itself, for it was what is called a clock lock, a clock inside the room performing this office automatically, and opening the door again at nine every morning except Sundays, Good Fridays, and the usual other holidays, which were duly allowed for in the mechanism.

"But," I said, "Good Friday and Easter Monday are not fixed dates, so how is that done!"

I was told that the works of the clock had a calendar barrel which arranged all these dates for a year, and was altered every 1st of January by the inventor of the apparatus, the foreman, a Swiss, named Schwarz. The room itself was built of cast-iron bricks locked together by spring dovetails; it had no windows, but was ventilated by holes pierced through in zig-zag directions, and a lamp burned there day and night. The clock which opened and shut the door was not visible, it was built up in the iron walls, and how it was got at to wind or alter it was only known to the inventor and the head of the firm. It kept absolute time and they said it could never stop without warning, even if the mainspring snapped, but I don't know how that was managed. The door of the safe opened outwards, and during the day was opened and shut and locked with an ordinary lock like any other door, but during the night no force save artillery or a steam ram could move it.

Now you wouldn't think, continued my informant, that the boldest burglars in the profession would waste two thoughts on such an impossible task as breaking in there; but they did. I don't know who they were, but they put up the finest job I ever came across. The principal actors in the drama, as I may call it, were our care-taker and his wife, two quite old people, who seemed to have been honest all their lives, but who, I suppose, were dazzled by the enormous extent of the proposed plunder.

This is how it was managed, though you will understand that the details only transpired afterwards. The old woman went away for change of air at Christmas; this was the first step. On the 31st of December (a Friday), the firm received a letter (forged) from a well-known customer, begging them to take charge of a safe containing some jewellery and a quantity of papers. Some vague excuse was made for not pursuing the obvious course of sending such things to their banker's rather than their jeweller's. A note of acquiescence was returned per bearer, and in the evening, a little before closing time, the safe arrived in a van. Though large, it was not heavy—being of wood, not iron, and therefore not worthy of its name. It was duly deposited in a corner of the strong room, and no one thought any more about it. Now, inside that wooden box were no papers or jewellery, but only our old hag of a housekeeper. Had the robbers been prudent, they would have made her lay hands on such goods only as would not be likely to be missed at once, and then, calling for the safe the next day, have got clear off with their plunder, and left no clue. But their plan was too ambitious.

On Saturday morning Mr. Caret and Schwarz went into the strong-room to alter the calendar-barrel of the clock, according to annual custom. They locked themselves in—their usual practice—but did not suspect that the old woman in the box was eagerly peeping from her concealment to see how the clock was opened. I don't envy her her long confinement in that box, though of course she was provided with eatables and drinkables. Anyhow she stuck to her post, and when at five o'clock—for that was our Saturday closing hour in those days—she heard the alarum go off, and the door bang, I warrant she was glad to come out and stretch her old back. A little before one on Sunday morning, the time agreed on for the robbery, she outs with her tools and breaks open the hidden clock machinery. None of her skeleton keys would tackle it, but a crow bar managed the job, for Herr Schwarz didn't expect to have this point attacked. She then found some connections with three bar-bolts which shot from the door of the room. She unscrewed these and removed the bars just as her husband, who was impatiently waiting outside, tapped at the door with his knuckles. She opened the door, doubtless with a feeling of triumph, but as she looked up to see what made it move so stiffly she uttered a yell of fear and dismay. With a noise which sounded on the guilty couple's ears like a clap of thunder, a second heavy door of solid iron, an armour plate four inches thick, descended in a groove in the lintel of the other. Before the husband could move out of the way he was caught and crushed by the middle, lying half in and half out of the room.

On Monday morning I was the first to arrive, and found a policeman standing sentry before the shop. He said the patrol had reported suspicious characters loitering around several times during the night, and the inspector had posted him there to look out. I thanked him, and he entered with me. What was our horror at seeing the legs of a man protruding from under the door of the safe, on which appeared for the first time in large letters the words

Stop Thief!

We sent hastily for Mr. Caret, but he could do nothing. Schwarz alone could explain the mystery and release the hapless wretch, who was just dead. The touch of a secret button caused the ponderous shield to rise again, and in the room we found the old woman, staring and shivering and laughing to herself in a corner; she was quite idiotic with the horror of those awful hours alone with her crushed husband, and died of the shock a week afterwards.

The explanation was simple. This second door, acted on by an electro-magnet and a second set of machinery, was an extra precaution invented by Schwarz, a burglar-trap, which should come into operation only if the safe were opened in any way after being closed for the night. He had kept it a secret even from the head of the firm, and his precautions had been more successful than he could ever have anticipated. The burglars who vainly waited so long outside to receive the expected plunder were never caught, but Messrs. Aytine & Caret's safe has never since been attempted.

The French Crown Jewels.

The approaching sale of the French Crown Jewels suggests some interesting reflections to a lady who signs herself "Dame d'Atours," in a description of them which she has contributed to the *Gaulois*. The seven historical stones which were among the first diamonds cut, and which were bought in Italy by Cardinal Mazarin, whose name they retain, formed part of the regalia in the reign of Louis XV. The collective value of these seven diamonds is estimated at £280,000; but one of the seven is to be retained by the Government, and this will considerably diminish the value of the six others. The only Crown diamonds which Queen Marie Antoinette wore were the large acorn-shaped stones which she could arrange either as bracelets, necklaces, or stomachers. She had some magnificent aigrettes and clasps, and a great many brooches for looping up her dresses, and diamond sprays; but these, like the splendid earrings which she always wore, were her own property, and the greater portion was handed down to the Duchesse d'Angoulême, the remainder being distributed among her friends. She did not like the diadem, and generally wore on State occasions the small crown which is placed at the back of the head. The Empress Joséphine had a great fondness for coloured stones, being of opinion that diamonds darkened her complexion; and as many of the ceremonies during the Empire took place in the daytime, she wore chiefly sapphires and rubies, which latter she styled the set-off of brunettes ("le fard de brunes"). She often wore a row of flat pearls over the forehead. The Empress Marie Louise, being very fair, did not mind wearing diamonds, and she was also fond of sapphires; the splendid diadem of sapphires, with the small crown of the same stones, which are included in the forthcoming sale, having belonged to her. The Duchesse d'Angoulême wore the diamonds bequeathed to her by Marie Antoinette; and the Duchesse de Berry, who was renowned for her fair hair and shapely arms, wore her finest jewels mounted either as combs or bracelets—not the large combs and heavy bracelets of the First Empire, but smaller and more tasteful articles. Queen Marie Amélie, wife of Louis Philippe, sometimes wore, in the form of a necklace, pearls belonging to the regalia; but she more frequently wore the sapphires and diamonds handed down by the Penthièvre family. Each Princess of the Orleans family received at her marriage a full set of diamonds—diadem, necklace, earrings, bracelets and sprays for the corsage; and was expected to wear them when presented at the Tulieries, those of the Duchesse d'Aumale being specially remarkable. The Duchesse de Montpensier received a very fine set of emeralds from the Spanish Court, which are now the property of her daughter, the Comtesse de Paris, and a curious story is told about them. A short time after his marriage, the Duc de Montpensier gave a large ball at Vincennes, and as the hairdresser had not arranged them in the Duchess's coiffure to his liking, he took her hair down and arranged them according to his fancy, while the guests who had arrived were waiting for their host and hostess. The Empress Eugénie wore the Crown jewels more frequently than any of her predecessors; and she completed the unequalled set of pearls which, with its four necklaces, can be used as a stomacher or to garnish a train. The Empress, who for a long time would not wear any ornaments which increased the height of the forehead, had a very handsome Russian diadem, which looks comparatively low on the forehead, made for her. This diadem reversed makes a very pretty necklace. The Empress gradually got to like the higher-setting diadems; and one which in later years she frequently wore, that of diamonds and turquoises, is included in the sale. She sold a short time ago a diadem of emeralds and brilliants which was her own property, and the so-called "pigeon's egg" necklace of pearls, which was bought by the late Mdme. de Païva. Among the other pieces of jewellery mounted by her order is a large quantity of vine leaves and currants set in diamonds and very delicately wrought. This also will be sold.—*St. James's Gazette.*

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Extracts from Consular Report.

STATISTICS OF WATCH-MANUFACTURING.

The Chamber of Commerce of Besançon has lately issued its annual report, in which the following has reference to the manufacture of watches:—

The number of watches for the Home market in 1883 amounted to 499,265, against 491,403 in 1882, and for export, 2,337, against 2,520 in the previous year; 491 watches have been made at various other towns of France, and 74,119 have been imported. So the number of watches sold in France amount to 573,875, to which Besançon contributed 87 per cent.

The importation of watches into France has been on the decrease since 1881.

The imports in 1883 at the various Customs offices was as follows:—Pontacher, 61,569; Bellegarde, 4,915; Besançon, 3,129; Paris, 2,489; Montéliard, 862; Lyons, 498; Bordeaux, Marseilles, Nizza, Nancy, Chambery, Nantes, and Le Havre, 297, together 74,119. In 1882 they amounted to 76,922, and in 1881 to 92,710.

The United States of America.—The year 1883 was, on the whole, not favourable to the watchmaking industries; for imports and home productions, business was bad.

Movements in the previous year were fairly in proportion to the demand, and thus commanded a fair price; but by reason of the import, which is out of proportion to the demand, and the extensive home production, the market is perfectly flooded with movements.

The American companies, of which Waltham and Elgin are the largest, but in addition to which there are five others, for the support of production, have several times lowered their prices this last year. The reduction in the production of expensive watches by the Elgin Company amounts to about 25 per cent. Business transactions are so cramped that this company paid the dealers a compensation in hard cash, equal to the amount by which all unsold movements have been lowered. The Waltham Company acted similarly. It appears highly probable that under such conditions the quality of watches made in American factories must decline, for every means are used to lower the prices as much as possible. Only by such means, and the lowering of wages, is it possible for some of the larger companies to pay a dividend, small as that is already.

Swiss watches have not quite lost their reputation, of which two classes are still in fair demand, viz., the best and the cheapest; in reference to the middle quality, American productions receive the preference. The outlook for the coming year is less encouraging for the watch manufacturing than other industries.

It is reported that some of the largest American factors intend stopping their works, which shows to what extent their production has accumulated.—*Report of the Swiss Consul in Philadelphia.*

Turquoise Mines and Pearl Fisheries of Persia.

The United States Minister at Teheran says that turquoise mining has for ages been an important source of wealth to Persia. There appears to be no historical record of turquoise mining in Persia before the 10th century, but after that the industry seems to have rapidly developed. The mines which are now in operation are the same as those worked 800 years ago, and are situated in Kerman and Khorassan. The former are now almost abandoned, the light green colour of the stones found there fading easily. and being but little prized. The mines of Khorassan are near Kishapoor, and are of great depth. Access to them is very difficult. The number of small or seed turquoises of light tint found in these mines is enormous. Mr. Benjamin states that last January a pound and a-half of the better grade of second-class stones were sold in Teheran for about £7 sterling. Stones of a dark sky-blue tint are comparatively scarce. The best turquoise mines in Persia, and, indeed, in the world, are at Aboù Riâh. All the mines of Khorassan are farmed by the Mohpered Dowlet, the Nasirè Dowlet, and one or two other officials connected with the Government. For this privilege they pay 18,000 tomâns annually to the Shah, a sum equivalent to £6,000. The best stones are sent to Europe, and there is at present no evidence of exhaustion in the Persian mines. The pearl fisheries, on the contrary, appear to be in a languishing condition. Formerly a very large source of revenue, they are at the present day probably not worth to the Government more than 50,000 tomâns or £16,000 per annum. The pearl beds are farmed by the chief men of the adjacent towns, and instead of being distributed in Persia, are for the most part sent to Europe by the steamers plying to the Persian Gulf. The reason for the present condition of the Persian pearl beds is that they have been allowed no rest, but have been constantly worked. In Ceylon the pearl oysters are allowed a rest for intervals of two years, during which they are allowed to mature. Mr. Benjamin says there is reason to believe, however, that the beds at the island of Karâk, near Bushire, which have not been worked for some time, are now in a condition to repay capital expended there, especially if diving is extended to a depth of fifty to sixty fathoms. As the ordinary depth reached by pearl divers is rather less than this, the Persian Government have recently sent to England for diving dresses of the latest invention, and an experienced diver has been engaged at a high salary. With the assistance of these, it is expected that the pearl fisheries of Persia will regain their former importance.—*Journal of the Society of Arts.*

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Trade Notes.

Last week we had the pleasure of viewing a grand silver challenge cup, manufactured by Mr. Restall, of 2, St. Martin's Place, Broad Street, Birmingham. It is true Rennaissance in style, the tablets illustrating the game of football, for which it is designed. The cup stands about 2 feet 6 inches high, has a figure on each side, seated in costume, at the base of each handle, and is surmounted by a figure 5 inches high, in the act of playing the ball. The modelling in each instance is full of vigour, and the anatomy perfect. This is the first specimen we have seen, and it assures us that Mr. Restall deserves a high place as an art worker in silver of this class. We are sorry that the weight had to be reduced to meet price, which is a sign of the times, but we are also pleased to find that the work throughout has not been allowed to suffer in this respect. We should have liked to have given our readers an illustration, but the commission was not given direct, Mr. Restall prefering to trade with tradesmen rather than clubs.

Davoine's "Directory of Switzerland for 1885," gives the names and addresses of ten thousand manufacturers of watches, watch tools, watch materials, and musical boxes. This is the thirty-fifth year of its publication. The fact that it was out of print in August last shows that it is appreciated by the trades it represents. It is invaluable to every watchmaker, as it points to the seat of manufacture of everything connected with the Swiss watch trade. Cheap postage and rapid communication has in many respects annihilated distance, and by means of such books traders are introduced to each other.

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Workshop Recipes.

Melting Gold.—In melting gold, use none other than a charcoal fire, and during the process sprinkle saltpetre and potash into the crucible occasionally. Do not attempt to melt with stone coal, as it renders the metal brittle and otherwise imperfect.

To Refine Gold.—If you desire to refine gold from the baser metals, swedge or roll it out very thin, then cut into narrow strips and curl up so as to prevent its lying flatly. Drop the pieces thus prepared into a vessel containing good nitric acid, in the proportion of acid 2 ounces, and pure rain-water ½ ounce. Suffer to remain until thoroughly dissolved, which will be the case in from one-half to one hour. Then pour off the liquid carefully, and you will find the gold in the form of yellow powder, lying at the bottom of the vessel. Wash it with pure water until it ceases to have an acid taste, after which you may melt and cast into any form you choose. Gold treated in this manner may be relied on as perfectly pure.

Melting and Refining.—In melting brass gold urge the fire to a great heat, and stir the metal with the long stem of a tobacco pipe, to prevent honeycombing. If steel or iron filings get into gold while melting, throw in a piece of sandiver the size of a common nut; it will attract the iron or steel from the gold into the flux; or sublimate of mercury will destroy the iron or steel. To cause gold to roll well, melt with a good heat, add a tablespoonful of sal ammoniac and charcoal, equal quantities, both pulverised, stir up well, put on the cover for two minutes, and pour.

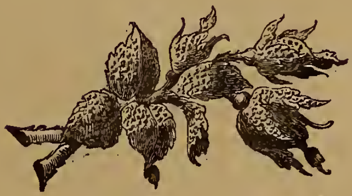
Recovering Gold from Colouring Bath.—Dissolve a handful of sulphate of iron in boiling water, and add it to your "colour" water; it precipitates the small particles of gold. Now draw off the water, being very careful not to disturb the auriferous sediment at the bottom. You will now proceed to wash the sediment from all trace of acid with plenty of boiling water; it will require three or four separate washings, with sufficient time between each to allow the water to cool and the sediment to settle before passing off the water; then dry in an iron vessel by the fire, and finally fuse in a covered skittle pot with a flux.

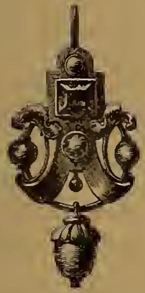
Removing Gold.—Gold is taken from the surface of silver by spreading over it a paste made of pulverised sal ammoniac with aquafortis, and heating it till the matter smokes and is nearly dry, when the gold may be separated by rubbing it with a scratch-brush.

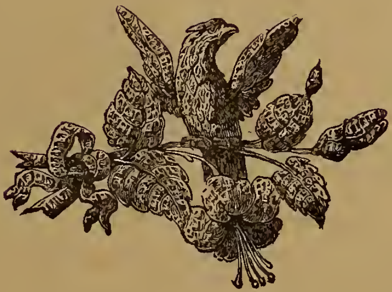
To Prevent Brass from Turning Brown.—Coat it with the following varnish: 1 part white shellac and 5 acohol; 1 shellac, 1 mastic, 7 alcohol; or 2 sandarac, 8 shellac, 1 Venetian turpentine, 50 alcohol; or, 12 parts sandarac, 6 mastic, 2 elemi, 1 Venetian turpentine, 64 alcohol. Clean the article well, do not handle any more with your hands, and warm to about 75° C.

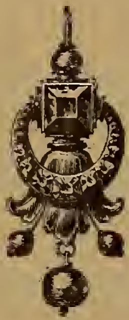
Supplement to the Watchmaker, Jeweller, and Silversmith, 1*st December,* 1884.

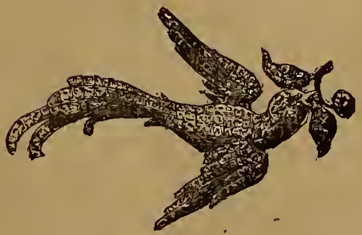
MONTHLY SUPPLEMENT OF DESIGNS.











THE
WATCHMAKER
JEWELLER
AND SILVERSMITH

Entered at Stationers' Hall.]

All need the beautiful—
Few can produce it.—Goethe.

[Registered for Transmission Abroad.

No. 116.—Vol. X.]

JANUARY 5th, 1885.

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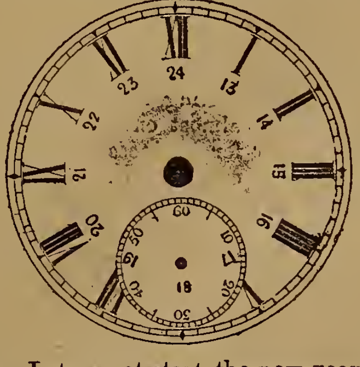
The New Method of Measuring Time.

THIS new method has received considerable attention from various contemporaries, and we publish some opinions which seem to predict an unfavourable reception. Clearly it will be the interest of those connected with the trade to offer every facility for making the new method acceptable and easy of adoption. All are agreed as to the advantage of the new system, and all seem to think the transition from the old to the new method will be difficult, and occupy at least a generation. Perhaps the accompanying sketch will suggest the simplest and most inexpensive way for allowing the new and old systems to go together side by side until the new system has asserted its superiority and gained pre-eminence.

A somewhat serious objection has been raised to the time it would occupy public clocks to strike the twenty-two, twenty-three, and twenty-four hours. Those who live near Big Ben would certainly have their rest disturbed, but it would be quite possible to devise a striking mechanism that would announce the hours thirteen to twenty-four in a much more agreeable way.

In any case we deem it our duty to counsel the trade not to place any obstruction in the way of progress. About twenty-five years ago there was a demand for keyless watches in the market, and many of the professed friends of English horology successfully opposed the introduction of keyless work that would have added about twenty per cent. to their business. Let us not start the new year by repeating such a blunder, or we may find ourselves in the rear.



Messrs. Kendal & Dent, Cheapside, writing to the *Times* in reference to the new method of measuring time, which the authorities of the Royal Observatory, Greenwich, have decided to introduce at the beginning of the year, say:—

"The change has been long advocated by scientific men, and there is little doubt but that in the course of time the new system will be generally adopted, at any rate throughout England and Scotland, as Ireland does not at present adopt Greenwich time as its standard. The change in question, however, offers a good opportunity of its doing so; and may be brought about easily enough, should the Corporations of the two leading cities decide in its favour, simply by setting the Corporation clocks of Dublin 25 minutes 22 seconds, and those of Belfast 23 minutes and 40 seconds forward at midnight on the 31st of December. The whole of Ireland would probably follow the example, and doubtless benefit by the change.

"One of the chief advantages of the new plan will be felt by the railway companies, as the method of reckoning from the meridian will be overcome, and the observations of a.m. and p.m. will no longer be necessary in the limited spaces of the time tables. It will be remembered that over thirty years ago the local authorities, without much difficulty, were induced to adopt railway time, that being London, *i.e.*, Greenwich time. It may, therefore, be reasonably expected that the public will adopt the new method. It may not be generally known that the dials of watches as at present used can, at a moderate cost, be altered so as to measure the time by the new method. There are undoubtedly objections to the innovation. To 'tell the time' at first will certainly be somewhat puzzling; for instance, when the minute and hour hands arrive at 17, 18, or 23 o'clock. The clock dial on the outside of Greenwich Observatory is at present a feature of great interest, as it measures the twenty-four hours by the new method. 'There is nothing new under the sun,' the so-called 'new method' being well known to Julius Cæsar, and there are many Roman chronometers in existence with the dials numbering from 1 to 24."

Sir Edmund Beckett writes to the same journal:—

"'The new method of measuring time' is not to be introduced quite so easily as some Cheapside watchmakers propose for that law-abiding country for which Dublin mean solar time is the standard by Act of Parliament, 33 & 34 Vict. c. 9, as Greenwich is for Great Britain. Other Acts are full of the common afternoon phraseology, which would require statutable alteration too. The great and very wise alteration which the late Meridian Conference could and did make was ordaining that the astronomical day should conform to the civil habit of beginning at midnight instead of the following noon. The civil habit of talking of '5 o'clock tea and 8 o'clock dinner' will not so easily be altered by any conference into '17 o'clock tea' and '20 o'clock dinner.' We had better begin with an Act of Parliament for calling all Acts of Parliament by their year instead of such a mouthful as 'thirty-three and thirty-four Victoria.'"

The *Times* correspondent on the subject says:—

"As regards the ordinary affairs of life we agree with Sir Edmund Beckett, in expecting the new method, at least for one generation, to be almost entirely inoperative. In the various appointments for business or pleasure which are made every day, there can be no uncertainty as to whether the time intended is a.m. or p.m.; and an invitation to dine at 8 o'clock would be as little likely to be misunderstood and to be supposed to apply to 8 in the morning as if 20 o'clock had been inscribed upon the card. Messrs. Kendal and Dent tell us that the dials of watches as at present used can, at a moderate cost, be altered so as to measure the time by the new method. The only way in which this could be done would be by painting upon the dial a second row of figures, within or around those in ordinary use, and going from thirteen to twenty-four. The cost of so altering a dial ought not to exceed two or three shillings, but the usefulness of the alteration would be very questionable. The watch so altered would tell its owner, for example, that it was either 1 o'clock or 13 o'clock, and would leave him to decide between the two alternatives by the aid of external and independent evidence. He would know just as well without the second row of figures that when his watch marked 1 o'clock by daylight the hour would be styled thirteen by purists. The difficulty of mentally adding twelve to any other hour of the day would not be insuperable by ordinary intelligences; and no further effort would be required in order to harmonize the two systems. If it were proposed to alter watches more extensively, to paint upon the dial the twenty-four hours in one circle as the twelve are painted at present, it would be necessary to provide the hour hand with an altered wheel, so that its complete revolution should occupy twenty-four hours instead of twelve; and to do this would involve an extensive re-construction and re-arrangement of the works. There is every probability that new watches will, to a large extent, be made in this way; but even for them we question whether the change would be desirable, or really conducive to utility. Next to being an accurate time-keeper, a watch can have no greater merit than easy legibility, so that it can be consulted by a dim light or by a person with defective vision; and nothing is so conducive to this particular kind of excellence as a white dial, with bold and well-separated figures, and with strongly marked hands. In an ordinary watch, as now constructed, the total space taken up by the figures on the dial is not much less than the aggregate of the interspaces; and, if twenty-four sets of figures had to be painted instead of twelve there would be scarcely any interspaces at all. Even the large dial of the Observatory clock at Greenwich looks uncomfortably crowded; and in a watch divided in the same manner the circle would be practically unbroken. The love of novelty will be sure to produce some demand for such watches; but, if we are not greatly mistaken, the balance of comfort and advantage will before long be found to be on the side of keeping to the existing arrangement.

"When we come to consider the case of clocks, the very idea of any alteration in them is too depressing to be contemplated with equanimity. Imagine what would be the state of an invalid, or of an uneasy sleeper, at midnight if all the clocks within hearing were to strike twenty-four instead of twelve. Even in its influence upon the healthy such an infliction would be a serious evil, only redeemed from being an unmixed one by the possibility that the last twelve strokes might be too much for the long suffering of the public, and that they might lead to the abolition of striking as far as large public clocks are concerned. With many of these the act of striking the hour is a serious and protracted business; and twenty-three would hardly be finished when twenty-four would begin. The time wasted by workpeople and others in listening and counting to make sure how many strokes were given would alone amount to something serious, more especially when it was supplemented, as it often would be, by a difference of opinion among fellow-workers upon the point, and by a consequent necessity for the despatch of a deputation to the public-house round the corner in order to see who was right. An alteration in the striking gear of a clock, such as would enable it to conform to the new system, would be very extensive, and would, of course, be in a corresponding degree costly; but a possible method would be to mount a separate bell, of a different tone from the other, and set to receive a single stroke, which should be regarded as equivalent to twelve strokes, at each hour after 12 o'clock. The supplementary stroke might either precede the others or follow them; but in either case it would be understood as adding twelve to them, and as converting one into thirteen, and so forth. The second bell for this purpose might be placed either within or above the other, much as the bells of chimney clocks are placed now; and in many instances the alteration might be made without much trouble or expense. Even when this is admitted we must revert to what we have already said about dials, and must express a doubt whether any change is required, or would in reality prove useful. In the present case, we are asked to depart from a system which works perfectly well for the purposes of business, although less perfectly for those of science; and the most probable issue will be that the two methods of notation will be carried on side by side. Each will be easily intelligible, and neither will interfere with the continued employment of the other."

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Important to Opticians.

PEOPLE speak about their eyes being fatigued, said a distinguished optician recently, meaning that the retina or seeing portion of the brain is fatigued, but such is not the case, as the retina hardly ever gets tired. The fatigue is in the inner and outer muscles attached to the eyeball, and the muscle of accommodation, which surrounds the lens of the eye. When a near object is to be looked at, this muscle relaxes, allows the lens to thicken, and increases its refractive power. The inner and outer muscles are used in adjusting the eye on the object to be looked at, the inner one being especially used when a near object is to be looked at. It is in the three muscles mentioned that the fatigue is felt, and relief is secured temporarily by closing the eyes or gazing at far distant objects. The usual indication of strain is a redness of the rim of the eyelid, betokening a congested state of the inner surface, accompanied with some pain. Rest is not the proper remedy for a fatigued eye, but the use of glasses of sufficient power to render unnecessary so much effort to accommodate the eye to vision. But glasses must be adjusted with judgment, or more injury than benefit is likely to result from their use. All persons who sell optical goods should inform themselves as to their nature, so as to avoid mistakes. The eye is an organ that cannot be trifled with, and eyesight is altogether too precious to be left to the mercy of ignorant and unskilled persons. At the first indication of trouble with the eyes an oculist should be consulted.

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The Matrix of the Diamond.

UNTIL the South African mines were discovered, the diamond was always found in sands and gravels, different from the mineral in which it was believed to be formed. At Griqualand West, however, the consolidated eruptive mud of the mines was believed by some to be the true matrix of the diamond; but opinions differed on the question, and arguments were found on both sides. M. Chaper, a French geologist, has, however, during a scientific mission to Hindostan, succeeded in finding the diamond in its mother rock. At Naizam, near Bellary, in the Madras Presidency, M. Chaper has found the diamond in a matrix of rose pegmatite, where it is associated with corundum. The tract of country is almost denuded of trees, bare and rocky, and the rains wasting the rocks every year expose fresh diamonds in the soil. The rock is traversed by veins of feldspar and epidotiferous quartz. Here the diamond is always found, associated with epidotiferous rose pegmatite. The diamond crystals observed are octahedral, but less distinct in line than the stones of South Africa, which seem to have been formed in a freer matrix. It follows from M. Chaper's discovery that diamonds may exist in all rocks arising from the destruction or erosion of pegmatite, for example, in quartzites with or without mica, clays, pudding stones, &c.

The Art of Metal-Working.

(*Continued from page 90.*)

UNTIL, and during the fifteenth century, the art of metal-working was so intimately intermixed with those of sculpture and painting, that there is little to say of it as a distinct branch. Luca della Robbia worked in bronze as well as majolica. Lorenzo Ghiberti, who has been treated of as a sculptor, gave great impetus to the art of casting in bronze by the wonderful perfection of his gates. The goldsmiths, from whose ranks came almost all the painters and sculptors of the day, enrolled among their number such names as Verrocchio, Pollajuolo, Finiguerra, Bartolommeo Cenni, etc., etc. But artistic skill in metal was not wholly confined to the more sculpturesque branch of the art; there were not wanting artists at the anvil. In the middle of the fifteenth century the brawny blacksmith, Niccolò Grosso, might have been seen in his shop in the market making the sparks fly beneath his hammer from morning till night, beating the stubborn metal into beautiful forms.

No easy modelling of soft clay, and moulding of molten bronze was his. The scrolls and flowers, the colonnettes and foliated capitals, had to be wrought out by the strength of his right arm and the power of fire. And by these means he formed the beautiful Gothic lantern which Cronaca put at the corners of the Palazzo Strozzi, and the magnificent rings and torch-holders, in the form of griffins, which adorn the walls. An honest dealer was Niccolò Grosso, but he required his own due to be rendered as well as the rights of his customers—the money half paid before the work was begun, and the whole, when it was completed, and no credit allowed. Such was Grosso's method of doing business, and he never departed from it for king or noble. By this practice of demanding "caparra," or earnest-money, the nickname of Caparra was given him, and he is better known by it than by his own name. Lorenzo de Medici so much appreciated his skill, that he wished to spread his fame into foreign lands by sending presents of his work, and came to the shop one day to give several important commissions. But the independent Caparra was hard at work for some poorer customers, who had, however, paid their half-fee, and so secured a claim on his earliest attention. The blacksmith would not even promise Lorenzo anything, nor take heed of his designs till the work was finished. "They came first," he said, "and must be served first; their money is as good as that of the Medici." Yet he would refuse money rather than not earn it honourably; for when some young men wanted him to make an instrument, which one of them had invented, by which bolts and bars might be forced, he proudly told them, "it was not a work for an honest man to construct or to use," and, on their persisting, he waxed wroth and drove them out of his shop in a fury.

Many of Caparra's works are no doubt extant in Florence, in the shape of lamps, hand-irons, torch-holders, and window bars, but, unfortunately, we have no proof of the anthenticity of any except those in the Palazzo Strozzi.

The great fifteenth-century piece of metal work, after Ghiberti's doors, is the silver altar of the Baptistery, Florence, in which all the best sculptors and goldsmiths of the age assisted. It was begun 1366, and finished 1477. It is preserved in the Guardaroba of the Opera del Duomo, where it may be always seen, but is only exposed to public view in the Baptistery on St. John's Day.

It is about five feet high and fifteen in length; the whole surface is divided by enamelled borders into niches and panels of Gothic design; the panels are filled with reliefs of scenes from the life of St. John the Baptist, and the niches, which are adorned with fine filagree-work, with statuettes of saints. As a long line of artists, from Orcagna to Verrocchio, worked on it, the progress of art for nearly a century may be traced there. Michelozzi's statuette of St. John, in the centre, shows very distinctly the training of his master, Donatello. The reliefs of Pollajuolo are remarkable for lively expression; he is much less hard in style when working in metal than he is in painting. A similar altar was made in Pistoja at the same time—from 1314 to 1466—to replace the altar which Vanni Fucci stole, and for the theft of which Dante has placed him in *Inferno*. The Pistojese altar is very elaborate, being composed of a mixture of silver, enamel, niello, and sculpture. The style is florid Gothic. The central portion contains fifteen Gospel stories, and statuettes of prophets and apostles; the right compartment, by Maestro Pietro di San Leonardo, a Florentine artist, has stories from the Old Testament, separated by enamelled bosses; the left side, by Leonardo di Ser Giovanni, Orcagna's pupil, illustrates the life St. James of Compostella. Brunelesco has contributed a fine bust of one of the prophets, and several other sculptors and goldsmiths assisted.

At the Exhibition of Arte Antica, held in Florence in the winter of 1880-81, a beautiful relief in silver, said to be by Ghiberti, was exhibited by Cav. P. Molini. It is a pax in the form of a tiny altar, with a predella. The subject is the Martyrdom of St. Peter. The Roman standards are seen borne amidst the crowd, which surges on between a a tower like that of Pisa, and a triumphal arch, probably an ideal of ancient Rome. Beneath, in the predella, is a miniature equestrian battle, of which the horses and figures are exquisitely modelled and finished.

So much was metal-working practised, that the most distinctive features of Florence in the fifteenth century were the shops, or *botteghe*, of the goldsmiths. These influential citizens mostly congregated in the wide but short street, between the market and the Piazza della Signoria, known as the Via Vacc-hereccia.

It was here that the beautiful pyxes, chalices, etc., were made, such as the one in the South Kensington Museum, with a relief of the Circumcision, for which Sandro Botticelli gave the design. Here, in the shop of Ghirlandajo and his father, the silver garlands were fashioned to adorn the tresses of the Florentine maidens, and the silver belts and buckles inlaid in niello, and the beautiful silver clasps for the books which enriched the libraries of Cosmo and Lorenzo de Medici.

In this street, amongst others of his trade, a certain Antonio Finiguerra might, about 1434, have been seen sitting at the stone bench which formed at once the window and door of the old shops in Florence, with all his simple paraphernalia around him—a few bowls with bits of gold, a few tiny casts, a rough lamp and blowpipe, and some bottles of *gum tragacanth*, spirit, etc. Behind him, probably, one of his assistants would have been seen hammering out a piece of gold or silver over a mould, on a tiny anvil; another might be drawing wire through a rough wooden machine, and some others at a bench drawing and painting the finest designs; among them a little boy of eight years old, showing an intelligent interest in every process, drawing infantile designs on bits of waste paper, hammering the scattered fragments into shapes on the anvil, and watching the delicate work growing into shape under his father's deft hands. This was Tommaso or Maso Finiguerra, who was destined to be the most famous artist in metal of his century. All his youthful days were spent in his father's shop, until he had acquired sufficient skill to begin an independent career, when he went into partnership with Pietro di Bartolommeo Sali, a very well-esteemed goldsmith. Here he formed a great friendship with a youth of nearly his own age, Antonio Pollajuolo, who worked with Pietro as paid assistant, and who, after Finiguerra's early death, became his partner. Antonio Pollajuolo was quite as talented and experienced as Maso Finiguerra. He had served his apprenticeship with Bartolo di Michele, the stepfather of Ghiberti, and had been taken from him to assist Ghiberti in his gates, when he won great repute from his marvellous representation of a quail in a festoon of leaves. The friendship between Maso and Antonio strengthened with years; the artistic emulation between them never degenerated into rivalry. Pollajuolo was ever ready to give ideas, and even designs, to his friend, and they often worked them out together. Antonio Pollajuolo's talent was in design and modelling; Finiguerra's in the finer process of niello and enamel.

Niello is to metal-working, what mosaic or intarsia is to sculpture. The design or picture is cut out in the surface of the metal with a graver, and the interstices filled with a black enamel, made of lead and lamp-black, called *nigellum*, whence the name niello; this is fused into the silver, and becomes lasting as the metal itself. It is said that we are indebted to Finiguerra's niello for the origin of steel-engraving. The following is the usually received story:—It was Finiguerra's custom to prove the effect of his work, when the design was cut in, by taking an impression in sulphur, and filling the engraved lines with lamp black and oil, thus getting a clear idea of its effect in niello, and being enabled to see the faults and rectify them. One day his servant placed one of these moulds face downwards on a damp cloth, and on removing it, Maso found his design perfectly reproduced on the cloth. This gave him the idea of taking his proofs on paper direct from the intaglio, instead of the intermediate process of a sulphur mould, which method he afterwards adopted.

One of these proofs exists in the possession of the Martelli family in Florence. The subject is an "Epiphany" of of most crowded composition—the decorations of dresses and embroidered brocades are represented in the most minute manner, the ground is covered with flowers as in one of Gozzoli's landscapes. Indeed, in the engraving many styles seem to meet. The three angels over the shed recall a picture by Ghirlandajo, while Dürer himself might have drawn the St. Joseph. The horses of the kings and their followers are of the orthodox Flanders race. A long, winding procession of camels and richly dressed people is seen defiling down the mountain background from the very top of the picture, which ends in a wall with towers. All this is depicted, with the highest finish, in a tiny print, three inches square. Only one other proof of the "Epiphany" exists besides this one; it is in the British Museum.

The finest of Finiguerra's niellos is the "Coronation of the Virgin," of which the original plate is in the Bargello Museum, and is dated 1452; the only known proof of it is in the Library at Paris.

The Bargello in Florence contains a beautiful pax, representing the "Crucifixion," a crowded subject, full of figures and horses, spoken of by Cellini in his "Oreficeria," as being from the design of Antonio Pollajuolo. It was originally used in the Baptistery. There is another pax adorned with the same subject in niello, by the hand of Finiguerra's contemporary, Matteo di Giovanni Dei, which was commissioned by the "Arte di Calimala" in 1455, but the artistic excellence is far below those of Finiguerra.

Antonio Pollajuolo, taking up the idea suggested by his friend's niello proofs, tried his hand at engraving specially for printing. There are only three of his works known, and they all show his chiselled outline and love of anatomy. They are the "Combat of Ten Nude Men," "Hercules and Antæus" and the "Strife of the Centaurs."

(*To be continued.*)

Short Essay on the Construction and Manufacture of Low-priced and Adjusted Key and Keyless Going-barrel Watches.

(*Continued from page 110, Vol. VIII.*)

"Comparisons are odious."

English and American Watches and their Systems of Production compared.

THAT comparisons are odious, is quite true; that they are necessary, is equally certain. To take the responsibility of discussing the relative merits of men and their work, is a task upon which we must enter with caution, for in such discussion we are bound to offend one party. Therefore, care must be taken most of all to avoid unworthy motives, which always too readily present themselves even to the wisest and best of men. This being done, we need not unduly concern ourselves with the consequences that may arise out of the fullest discussion of the most unfavourable of comparisons.

Dr. Theodore Cuyler, a distinguished American writer and orator, who has frequently visited this country, and therefore has had a good opportunity of judging of the two countries, says:—"the general characteristics of an American and an Englishman are summed up in the words by which we start our railway trains. In America, when a train has taken its passengers on board, the guards in charge shout to each other 'A-head! a-head!' and the one near the engine gives the final word 'Go a-head!' and immediately the train speeds on its way. In England, as you are aware, the corresponding words used by the guards are 'Right, right!' and the final word which starts the engine, is 'All right!'" This is not the place, and the writer is not the person, to discuss the differences between English and American character, but we may safely take the hint that is here given us as a guide when we compare English and American watches.

In England when we attempt to make a watch—I speak of our medium and best work—we aim at the very best thing that can be made. No effort on our part is spared in securing a mechanism that experience has placed beyond doubt is the best. Care is also taken to select the very best of materials, not only of brass and steel, but also the hardest and finest of rubies and sapphires, and if the case is made of silver or gold, we give with it a guarantee of quality of the metal. In these things doubtless we are *all right.* We consider a fuzee better than a going barrel, and who can deny that a fuzee is not better than a going barrel? As to workmanship, we are prepared to prove that we approach very near to perfection, or, if you prefer it, we can bring the testimony of our opponents as to the superiority of our work; and who shall say that in these things we are not *all right?* A diamond is counted among the precious stones of an English watch because it is harder than a ruby, and a pivot working upon it, will have less friction, and its presence proves we are *all right.* The performance of our watches is better than you can get from those that are made abroad; their rates are more permanent, and the entire mechanism more durable than those of any nation. This fact alone is sufficient to prove that we are *all right.*

Seeing that such is the case, how do you account for the fact that our trade is falling off in every direction? The Clerkenweller, fully assured that he is *all right,* makes his expensive watch and takes it from John-o'-Groat's to the Land's End, and then to the far verge of the world, and is not able to sell it. During that long and weary journey he has had the gratification—I will not say mortification—of seeing American and Swiss watches sell by thousands. Explain to me a matter so paradoxical.

Assuming, and we may safely do this, that error cannot be maintained by correct reasoning, shall we seek for a solution of this difficulty in the statements we have just made about our best work. Is there a fallacy lurking there? Or shall we persist in these views, and talk plenty of refined nonsense about guiding the public mind; or shall we let the public mind be to us a guide?

Pardon the abruptness of my inquiry touching the diamond end-stone. If there is a mechanical advantage in placing it in the balance-cock, why not put a diamond end-stone to cover the foothole of the balance also; and in like manner make diamond end-covers to the scape-wheel and pallets also? The cost of the finest end-stones does not exceed 3s. 6d. each, and surely an important result achieved by such an addition would be cheap at a guinea. Your prompt reply is—the advantage is so small as not to be appreciable even in the finest work that is made. Then, I conclude, its presence only proves so much eye service; and in attempting thereby to deceive others, have we not deceived ourselves? Do you think we might advance similar statements about a fuzee? Is not much of what we call best workmanship of questionable value? Have we really considered the best way of obtaining a maximum of results with a minimum of cost? Are you quite sure we are *all right?*

The character of a nation is legibly written in the work it produces; their fabrics are the natural outcome, and show the mind of the people. Carefully study these and you will have an unbiassed account of the tastes, dispositions, and attainments of the people by whom they are produced.

We are not wanting written expositions of the character of the inhabitants of the United States; they are met with on all sides, and form a most entertaining part of our everyday literature. Perhaps there has been no man in our time more competent to speak on this matter than the late Charles Dickens, and while he has unsparingly laid before the world all their weak points, he sums up the whole matter in these words:—"They are, by nature, frank, brave, cordial, hospitable and affectionate. Cultivation and refinement seem but to enhance their warmth of heart and ardent enthusiasm, and it is the possession of these latter qualities in a most marked degree, which renders an educated American one of the most endearing and most generous of friends. I was never so won upon, as by this class; never yielded up my full confidence and esteem so readily and pleasurably, as to them, never can make again, in half-a-year, so many friends for whom I seem to entertain the regard of half a life. These qualities are natural, I implicitly believe, to the whole people."

Compared with an Englishman, the American is a lighthearted man. While, for the most part, we are "murmuring" and "growling," he is brim-full of happy thoughts. There is on the part of Americans a willingness to waive certain personal rights which we too readily insist upon. This is not horology, but I know you will pardon me if I cause one such character to pass before you; because it will help us to arrive at some of the weak points in English watch-making.

During the American civil war, one of the hospitals for wounded soldiers showed in a marked degree the speedy recovery of nearly all the patients sent there; so much so, that it was deemed advisable to inspect and report upon the causes that contributed to such happy results. Consequently a duly appointed staff was sent for this purpose. On arriving at the hospital, they found all the patients convalescent; but to their great astonishment they could not find the doctor. This caused much amusement to the visitors, and on hearing jokes being freely passed among them, one of the patients beckoned with his hand, and then pointing said, if you will follow that stream, it will bring you to an out-house. Most likely you will find the doctor there. Away they went, and on arriving found a man, with coat off and shirt-sleeves turned up, washing a large tub of clothes. They immediately made known the object of their visit and asked to see the doctor. "Gentlemen," he replied, "I am the doctor. The reason you see me here is, I find that cleanliness and plenty of clean linen are among the best means of recovery, and, being very short of help, I have to come here to wash the clothes." Here is a man of good breeding, great learning, well skilled in the divine art of healing the sick, stealthily doing a most menial act.

It is this selfsame element of character that makes Americans so successful in their industries. You will see it in every street and every store in their country. They take a comprehensive grasp of the world's wants; they care for and cater for the wants of the million, and yet they are not insensible of the requirements of the more fortunate few that we designate the upper ten. Lacking this element leaves us in the rear in horology. In this industry we seem sadly to forget that "Ich dien," I serve, is the only motto that can precede "Rex Regis," a ruler; we fail to serve because we fail to reach the masses of the people.

Richard Whittaker.

(*To be continued.*)

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The Age of Inventions.

OUR nineteenth century, says the *Central Anzeiger*, is without a doubt the age of inventions, and the number of the latter is, perhaps, without an equal in the world's history. Of course, inventions for the benefit of the human race have been made ever since its creation, but when we look back simply for one hundred years, we must be astonished at the number of inventions made in so short a space of time; and how many of them date only since fifty years ago! The perfection of the locomotive and steamboat, telegraph, telephone, audiphone, electric light, sewing machine, photography, chromo-lithography, cylinder printing presses, elevators for high buildings, cotton gin, spinning machine, reaper and mower, steam threshing machine, steam fire-engine, improvements in the manufacture of steel, dynamometry, the employment of anæsthetics to ease pain. and many more, pertain to this period. Various other important discoveries and inventions are in a nascent state. The use of coal-gas and petroleum for heating and cooking is already a success, also the supplying of steam as motive power and for heating from central stations. The artificial preparation of butter is a notorious fact; flying through the air is a subject of experimenting, and the use of electric motive power is on the eve of being solved. Several problems of mechanics have until now evaded solution; but will they be more difficult to solve than the problem of the ocean cable, by means of which two persons, separated by thousands of miles of ocean, converse with each other; or of photography, or of telephony? We employ chemical agents and freeze ice, which equals the best product of nature, in the torrid heat of midsummer. Our surgeons transplant the skin from the arm of one man into the face of another one; it adheres and becomes a part of his own body. We manufacture a mile of printing paper, swathe it around a spindle from which a printing press unrolls, prints, cuts, folds, counts, and in the course of time delivers, all counted, so many thousand of printed papers per hour.

Verily, our age is an age of inventions, and it would be foolhardy to draw the line between the possible and impossible.

Jewellery:

ITS HISTORY AND MANUFACTURE PRACTICALLY TREATED AND ILLUSTRATED.*

(*Continued from page 93.*)

IN reference to the remarks previously made as regards the development of the manufacture of jewellery amongst savage races, it will, no doubt, be of interest to most of our readers to give some slight description of the manufactured articles which formed a portion of the Ashanti indemnity; although I do not consider that the articles described altogether bear out the theory there advanced of the rise and progress of the art of jewellery amongst savage races, because it is quite certain that at the present time most nations, however primitive may be their state of civilization, have for years had some intercourse with others far more advanced in that respect, and latterly have come in contact with exploring parties of various nationalities, composed of individuals belonging to countries which have reached the highest pitch of civilization and culture which the world has ever seen. In this way, no doubt, various articles of modern jewellery have come into the possession of the natives of countries through which these expeditions have passed, and have been copied by them as well as their appliances would allow.

This, no doubt, has also been the case in ancient times, and not only have articles been copied by the natives of countries into which they were imported, but I am inclined to think that the importation of these articles of value, was carried on to a much greater extent than has been allowed for by antiquarians, and that much of the jewellery assigned to various nations, was not made by them at all, but acquired either by purchase, or, as was more fashionable at the time to which I refer, by the right of the sword; however, we will return to this subject later on in its proper place, and proceed now with the Ashanti articles.† "The majority of the objects are for personal use, or rather I should say for personal decoration. A people so little advanced in the scale of civilization, cannot be compared in their employment of the precious metals, however lavish, with the ancient Assyrians, whose gold was wrought into objects of daily use, or even with the Mexicans, as Cortes found them in the sixteenth century. Personal adornment is in the main restricted to the manufacture of objects of gold; they use knife and dagger handles of gold, and to give splendour to their king's audiences, gold is used with no sparing hand. These ornaments may be divided into two classes—those made in direct imitation of natural objects, and those copied from artificial, generally European, models.

"Amongst the objects copied from nature are cast heads, claws and teeth of the natural size, also miniature jaw-bones, set with teeth are common, together with thigh and other human bones; larger animals, as lions, antelopes and leopards, are imitated in a rude manner on plaques of gold, partly *repoussé*. Shells are most abundantly copied from nature, cast in moulds taken from the objects themselves, and cast with considerable skill. These are chiefly of three kinds—the money cowrie, two species of turritella, and perhaps a scalaria. Feathers are also copied, and leaves.

"Among the objects imitated from artificial, generally European models, we find a most curious collection. Here the strong imitative faculty of the native has had scope. It will be sufficient to mention that among them are reliquaries, open-work ornaments of European eighteenth-century design, filagree buttons of Spanish or Portuguese patterns, but with the wire-work imitated wholly by casting; ornaments from foreign uniforms reproduced in heavy gold, buckles, locks, and keys, a padlock, a seal cast from a model that had lost a stone. Many of the finger-rings are directly modelled on European patterns. Many of these imitated European objects are not merely curiosities of barbaric imitation, but they have a further interest. They illustrate the method of ornament traditional amongst Ashanti workmen; for example, one of the splendid circular ornaments worn by the Ocras, or selected attendants of the king, is ornamented with a relief pattern in massive gold. All these discs are remarkable objects, and the ornament on several is very effective, and admirably executed. Another example of a common European object ornamented in native taste, is a large gold padlock. Probably the surface of the model was almost, if not quite plain, but the Ashanti has enriched his copy with a very effective pattern in relief, probably *repoussé*, of curved lines, arranged with much variety and skill, while portions of symetrical ornament balance each other with excellent judgment. The processes used cannot of course be spoken of as to actual modus operandi, but such a collection, as the one under review, enables one to say, what processes they must certainly have had. Casting must first be mentioned, for in this they evince undoubted skill. It may be their appliances are simple and rude, but then the Indian, instructed in ancient traditional processes, produces work the beauty of which is at length freely acknowledged in Europe. Their powers of adaption must be great, to enable them to copy objects wholly strange to them. The casting is very clean, delicate, and cleanly delivered. The filagree buttons previously mentioned, are curious examples of skill, and still more so, perhaps, are some of the flatted discs which have all the appearance of being composed of fine wire laid together, so sharply has the mould indicated the sutures. These discs raise another curious question to be touched upon presently. Their castings of perforated work are also remarkable. Among them are beadlike ornaments evincing no common skill on the part of the workman, especially when it is remembered that they make comparatively little use of soldering. In casting, they use the process known in Europe as *cire perdue*, in which a wax model is made and afterwards melted out of a mould formed upon it, the space so left being filled with molten metal. Next to the fusible excellence of gold, the Ashanti has learned its ductility, and some of their wire-work is delicate and excellent. This wire-working seems to me an ancient traditional process among them, and there are undoubted signs of its present decay; casting being employed, where at a former period woven wire-work would have been used. The malleable quality of gold, the Ashantis appear to understand, but not completely. Beaten or *repoussé* is therefore familiar to them, the more so as it gives that varied effect and richness of surface decoration, in which they delight to display the georgeous nature of the metal; but leaf gold they have not arrived at; their substitute is thick plating attached to the surface by pins. This plating is effected by forcing thin plates of gold into the patterns, previously carved upon the objects to be covered, and then fixing to the surface. This is shown in several of the examples forming part of the present collection, notably on the large wooden balls, overlaid with gold, forming the supports of the "messenger" sword. The ornament forming the top of the king's state umbrella, is so plated, as well as other carved decorations with which it is enriched. The process of soldering does not seem to have been used in the specimens here considered, but I am informed that they are acquainted with the use of the blowpipe in soldering, and that they employ borax; they have also a method of welding together portions of gold, which is most ingeniously and skillfully employed. In making the analysis of pieces of metal so joined, no solder was detected.

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† "Notes on Specimens of Wrought Gold forming a portion of the Ashantee Indemnity." By R. H. Soden Smith, M.A., F.S.A., in the "Archæological Journal," vol. xxxi.

"It remains for me to point out some general conclusions to which the examination of this remarkable collection leads, in comparison with the goldsmiths' work of other races. It has been remarked, and with some truth, that strong resemblance can be traced between various specimens of Ashanti gold-work included in this mass of treasure, and the work of several early races, notably, the Celtic, Saxon, and Scandinavian tribes. This resemblance, no doubt, exists to a degree, but it is mainly superficial, and thus far common to almost all tribes who have wrought in the precious metals during their period of semi-barbarism. The same superficial resemblance, or rather analogy, exists between Abyssinian work and early Mexican, between Scandinavian goldwork and that found in the Indian groves of Colombia; and instances can be multiplied. It is due to the use of certain processes, which, because they are the most obvious and easy, have been practised since gold was first wrought, and to certain simple motives of surface ornament which have occured to most semi-savage tribes, and which have become traditional amongst their descendants.

"A resemblance of another kind can be traced between certain specimens of Ashanti work and the ancient Egyptian gold, which has come down to us, as well as with the traditional and somewhat imperfect productions of Abyssinia. It is not to be supposed, however, that one discovers here the skill of ancient Egyptians, their wonderful knowledge of metal-working processes and their advanced art in surface chasing, which has never been surpassed.

(*To be continued.*)

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Rating of Watches.

To the Editor of "The Times."

Sir, — When the Kew Observatory commenced rating watches for manufacturers and the public, the conditions under which certificates were to be awarded were stated by many watchmakers to be so rigorous as to be practically impossible of attainment by any save specially constructed watches, which could only be produced at a fabulous cost.

Experience has, however, proved that watches can without difficulty be made to pass our tests; but my reason for troubling you with this letter is to ask you to chronicle, as a noteworthy event in horological science, that we have just been able to award our highest possible certificate, a Class A, especially good, to a watch submitted to us by a London firm, the cost of which is by no means so great as that frequently paid by gentlemen for a reputed good watch.

Space would not permit of my giving details of the tests it has passed through, but it will suffice to say that in no case during the eight weeks of its severe trials, in the manner so graphically described in your leader of April 28 last, have we been able to detect a mean variation of three quarters of a second in its rate.

Yours faithfully,
G. M. Whipple,
Superintendent.

Kew Observatory, Richmond,
December 26th, 1884.

[It is a remarkable fact that, while there is a great falling-off in the English watch manufacturing business, at no period of our history have we achieved higher results in timekeeping. It is not too much to state that there is but one step between present depression and real prosperity.—Ed. W. J. & S.]

Correspondence Column.

THE SILVER TRADE.

TO THE EDITOR OF THE "WATCHMAKER, JEWELLER, AND SILVERSMITH."

SIR,—The past year has proved to be more full of the promise of change in the silver trade than of change actually accomplished. The only legislation took the form of an enactment, the joint production of Mr. Courtney and Mr. Herbert Gladstone, by which it was sought to soothe the East Indian interest, whose case against our fiscal regulations, since the abolition of protective duties in Hindostan, had become too strong to be any longer ignored.

Accordingly a clause was inserted in a Bill for amending the Customs and Inland Revenue, in which it was enacted that "articles of foreign plate of Oriental pattern shall, subject to the payment of the proper duties of customs, be exempted from assay in the United Kingdom."

This odd piece of law-making—which for ever sets aside all pretext for compulsory Hall-marking in Great Britain, if even-handed justice is to be the rule amongst us—assumes the existence of a kind of knowledge amongst Custom House officials which can only be acquired by very special study. A detachment of South Kensington graduates detailed off to our various ports of entry would be needed to give even the semblance of efficiency to an enactment so vague and so practically unworkable. Where does the official Orient begin, where end? You may go east and east until you reach China and Japan, and when there there is still a further east, which will ultimately land you in New York and Philadelphia. Official tinkering such as this is only a proof of the need for a bold and incisive course of action for the better regulating of the trade in silver plate. How it has worked, if it has worked at all, will no doubt be seen when the Chancellor of the Exchequer presents his annual statement in the spring of the year.

But the Chancellor himself, if we may judge by his latest statement in the House of Commons, is fully bent on doing all that a government can rightly do in furtherance of any particular trade—he intends to abolish the duty, and place the trade under regulations which will give it a fair field for working out its own revival.

Assuming the correctness of this, it behoves the trade to consider well under what new regulations it is likely to be carried on with success. That a very large proportion of the greatly augmented output that is sure to follow on emancipation will still be sent to the Hall, in order to be officially guaranteed as of sterling silver, admits of no reasonable doubt. But, whatever other changes may be made, it is absolutely imperative, in the interest of all engaged in the trade, that a distinctive mark shall be granted which shall tell at a glance that the article is genuine silver and not merely an imitation.

When about the year 1842 Messrs. Elkington first opened their sale shop at the corner of Regent Street and Jermyn Street, all who were in the silver trade at the West End could see that, crude and unsatisfactory as the work then was, there were possibilities in the manufacture which boded no good for the future of sterling silver.

Since then it has always appeared a singular oversight on the part of the Goldsmiths' Company, the supposed guardians of the interests of the trade, that they did not take steps for securing a fair field to the older manufacture. If the new was to be carried on without let or hindrance as to quality, and entirely free from taxation on their materials, surely the old should have been released at once from a duty which so greatly enhances the price of the silver sold by them.

At that time the importance of distinctive trade marks seems to have been lost sight of in most parts of this country, Sheffield being the main exception; but nowadays their value is being every day more and more appreciated.

There are those who affirm with great confidence that the distinction between the marks for sterling silver and its imitations are quite sufficient for all purposes. But self-interest is apt at fitting us with very discriminating spectacles where our own advantage is concerned. Does any one believe that, with the new value attached to marks, the electro-platers would have been allowed to sail so near the wind in their imitation of the silver marks in form and position? The greatest expert cannot tell any difference at a very short distance from the object, and one who is not an expert may sometimes be induced to choose wrongly. It does not require a love of display so great as that of Sir Gorgius Midas before a rich man can be induced to entertain his friends on articles of genuine silver, but he will doubtless, as a rule, feel a desire to get credit for his act. Let something then be done to show a difference where that difference is so real, and the silver trade will then have a fair chance of holding is own against all comers.

Another old manufacture has, in a few years, sprung into renewed activity, after even a more complete decay than that of the silver trade. Crown Derby china, a most risky and expensive manufacture, has made for itself a new demand, and is, by a liberal expenditure of capital, and the hire of thoroughly competent leaders in art, achieving a success, both at home and in America, that keeps their large factory fully at work even in these critical times. Their success has been gained in the face of showy and lower-priced goods which abound in the market, proving that merit has yet something to do with success, and that when there shall be less importance attached to mere weight of silver, and more to the mind displayed in its working up, there will be a new era opened up for all concerned. In the production of cups for our national sports alone there is ample scope for the formation of a national school of silversmithing, but at present it is by no means uncommon to see designs, that have been admirably put on paper, quite marred in the making up by incompetent artists and workmen, the spirit gone, the figures inaccurate and lifeless, and the whole made lumpy and uninteresting; the guaranteed number of ounces may be there, but nothing that a man of taste would care to have about him. In these days of exhibitions we may be approaching the time when one will be held showing the cups and other trophies which have been given since such things became fashionable, and we shall then be able to see in what direction improvement is most needed.

To all who are engaged in English manufacture, the Report of the Commissioners on Technical Education presents an array of facts and opinions connected with our work at home, and that of our continental rivals, which is invaluable for our future guidance. It shows us wherein we are strong, and where weak, as compared with others. Their recommendations to us are numerous and pointed, but one favourite panacea, much advanced by certain parties, has no place in their list; they do not recommend legislative protection in any form or degree. Large employers of labour at home as some of them were, they see safety for us only in the wise use of our heads and hands. Education, elementary and technical, for all our workers is the least that will put us and keep us on a level with the more far-sighted of our rivals. Schools, colleges, institutes, are their prescriptions. Already we are in possession of a better organised system of art teaching than anywhere else exists, although, in some of our industries, the connecting link between the art schools and the workshops has not been so strong as it ought to be. Still, there is progress being made in many directions, and a spirit been created which will ultimately lead to important results.

The present time seems to many an inauspicious one for indulging in hopeful views, yet it is just the time when preparations can be most efficiently made for the inevitable revival of trade. A very few years ago Bradford was in everyone's mouth as an illustration of our national decadence in manufacture, yet it is but a few weeks since the Mayor of the town said publicly that there was machinery in the town at a standstill because of the scarcity of skilled workmen, the demand for their now improved goods being so great. All classes—capitalists, machine makers, dyers, and operatives, had worked to compete with the French and German goods, which for a time had the hold on the market, and they have now displaced them, in many instances, both at home and abroad.

There are good grounds for hope, then, if the silver trade will go and do likewise.

That they may by enlightened enterprise grow and reap success is the sincere wish of

An Old Hand.

TAPERED MAIN SPRINGS.

TO THE EDITOR OF THE "WATCHMAKER, JEWELLER, AND SILVERSMITH."

Sir,—I am glad to have elicited a reply from Mr. Herrmann to my former letter upon this subject, although I am disappointed to find that the result of experiments has not been sufficiently good to induce him to believe that a tapered main spring is better than a straight one for English going-barrel watches.

It is the falling-off of the vibration as the watch is running down, that I am most interested in. I care not what means are applied to make the vibration the same at the bottom as the top, as in a fusee watch, but it does seem to me a very weak point in the expensive English watches made with this defect in them.

Manufacturers, as a rule, see their watches only in a clean condition, but retailers have to regulate them for their customers as they become dirty, when the bad effect of this sluggish bottom vibration makes itself evident by its irregularity of time-keeping.

If Mr. Herrmann, or some other scientific horologist, can devise some means of producing an *equal and good vibration* in going-barrel watches, they will earn the lasting gratitude of retailers and wearers.

These few remarks apply more particularly to expensive watches that have not been adjusted or timed in positions.

I am, your obedient servant,

J. D. Fisher.

228, High Street, Lincoln,
December 23rd, 1884.

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The Kew Observatory.

RICHMOND, SURREY.

THE WATCH-RATING DEPARTMENT IS NOW OPENED.

Full particulars as to Regulations, Fees, Certificates, and Rate-Statements, post free on application to the Superintendent.

Miscellaneous.

A SCOTCH paper announces that the Scottish pearl seekers have met with unusual success this year, securing pearls in great numbers, some of which have been sold at high prices. Some of the rivers in the north of Scotland abound in pearl-bearing mussels, and this year has been unusually favourable to obtaining them, owing to the low state of water in the rivers. As a consequence of these remarkably valuable "finds," the inhabitants along the banks of the river have abandoned their usual avocations and turned their attention to mussel hunting. It is feared that great injury has been inflicted upon the pearl industry of the future by the reckless destruction of mussels that has been caused by this rush of pearl seekers, who prosecute their work without regard to future production. A demand is made for some sort of legal protection for the incipient but possible pearl-bearing mussels.

The International Inventions Exhibition.—The Executive Council and Sub-committees of the Exhibition have been sitting at the Society of Arts, since the middle of October, and have made considerable progress with the arrangements.

The applications for space have now all been examined by Sub-Committees of the Council, and a selection has been made of the most promising. The number of applications has been so great that it has been decided to limit very strictly the admissions in those classes which may be considered to have been fully represented in the Exhibitions of the present and of the past year. The Council will, therefore, be obliged to refuse many valuable exhibits in such classes as those relating to food, clothing, and building construction. It will even be a difficult matter to accomodate those which have been selected, and it is feared that the list will have to be still further reduced. As soon as possible, information will be sent to those who have applied for space; but the enormous number of applications, far in excess of what was expected, have made it impossible to do this up to the present.

The Guarantee Fund now amounts to £48,280, a sum considerably in excess of that subscribed for the Health Exhibition, or for the Fisheries, the amount for the former being £26,518, and that for the later £26,656.

The Board of Trade have granted an additional certificate with a view to ensure the protection of inventions exhibited next year, during the period from the 1st of March down to the 1st of May, the time during which the exhibits will be received and arranged. A previous certificate, dated August last, enabled exhibitors to secure protection for their inventions as from the 1st of May, the date of the opening of the Exhibition. An exhibitor desiring to avail himself of this method of protecting his invention, will have to comply with certain conditions stated in the Patents, Designs, and Trade Marks Act, 1883; that is to say, he must, before exhibiting, give the Comptroller of Patents notice of his intention to do so, and pay a fee of 10s. This notice must be accompanied by a brief description of the invention. After these conditions have been complied with, the exhibition of the invention does not prejudice the right of the inventor to obtain a patent for it, provided the application for the patent be made before or within six months from the date of the opening of the Exhibition.

A printed copy of the extracts from the Patents, Designs, and Trade Marks Act, 1883, bearing on this subject, may be obtained on application to the secretary, International Inventions Exhibition.—*Journal of the Society of Arts.*

HOW TIME IS MEASURED.—How the hundredth part of a second is measured is told in the *Washington Post.* It says:—"The chronograph, as its name implies, is a time-writer. Without it the division of time into a hundredth part of a second—a division so small that the mind can hardly appreciate it—would be impossible. It is a revolving cylinder, bearing a fountain-pen attached to a magnet. As the pendulum of the clock swings its seconds it sends the electric current to the magnet. The latter gives a nervous click, and the pen marks a small but distinct break on the paper. These breaks distinguish the seconds, and the space between them is measured by fine divisions on a slip of steel. A second in time, measured by space, is about as long as this: ———."

CAUTION TO EMIGRANTS.—The Custom House officers, at Montreal, have been surprising smugglers on the lines and from the ships in port. A seizure was made last month of over $1,000 of smuggled jewellery, which an emigrant named H. Hobbs had brought into the country from England without paying the duty. Another capture was made of a man named George Clarke, near Stanstead, who had been continuously smuggling since May for a manufacturing company. Both culprits are in gaol.

COURTESY IN BUSINESS.—In business, as well as in social life, the exercise of a little courtesy will smooth over many rough places and prevent considerable trouble. In the competition among dealers of all kinds there arises a sort of jealousy, and it is a very easy thing to make a charge of bad faith against some party, and the charge is taken for granted, and no investigation made as to its truth or falsity.

The selling of contract goods is very liable to lead to charges of bad faith. Mr. A hears that Mr. B has sold below the stipulated prices, and at once informs the manufacturer, and the latter, in too many cases, takes it for granted that the charge is true, when a little investigation, such as business courtesy should require, would clear the thing up and show there is a mistake all round.

There are many other cases where misunderstandings arise that could be cleared up by a little judicious action. It is always a good plan to hear both sides of a question—in fact, that is the only way a fair verdict can possibly be had, and, in deciding questions of business, a judicial attitude is very necessary. It is on this idea that many commercial bodies have their committees of arbitration, where both sides can be heard and a just decision rendered. If each merchant, when a dispute arises, will constitute himself a committee of arbitration, there will soon be a business millennium.

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Wise or Otherwise.

HOROLOGICAL clubs have long been a great boon to our trade. Let those who deride such institutions as so many bar-parlours to a public house, read with astonishment the following sentences from the *New York Jewellers' Circular*:—

"In the early days of September this vicinity was visited by a 'heated term' of almost unprecedented length and severity. In the city the sun poured down its heated rays with prostrating intensity; the pavements almost glowing with fiery heat, while the solid walls of brick buildings that line the streets were charged with caloric to a degree that threatened immediate combustion, heating the little air that was stirring to an almost intolerable degree. Everybody that could do so fled to the mountains or the seaside, preferring to swelter and melt away in the open air, where there was plenty of room, to suffering cremation in the brick bound city. Among those who flitted away were the members of the Horological Club, those venerable and expert horologists, whose amiable discussions of technical questions have conveyed so much valuable information to our readers. The chairman came down from the mountains for the express purpose of presiding at the monthly meeting; his costume consisted of a linen duster and two palm leaf fans. At the appointed hour he tapped the table with his gavel, but none of his able associates appeared; of all that noble army he alone had courage to brave the dangers of the heated term. Perspiring at every pore, he gazed about him sadly; although nearly disintegrated by the heat, and almost emulating a late distinguished actor of Bowery fame, who used to advertise that he would 'appear in several pieces,' the Chairman decided that while there was a possibility of his being obliged to occupy all the chairs, there was not enough of him to constitute a quorum. So he adjourned himself for one month. The last seen of him he was evaporating in the direction of the Catskills on a cake of ice, his two palm leaf fans vainly striving to still further lower the temperature of his body."

A SCIENTIFIC lecturer was explaining to a Limerick audience that pure spirit absorbs water. "Suppose," said the lecturer, "you take one quart of the best Irish whisky, and mix with it one quart of water, you would not have two quarts of liquid." "Perhaps not," replied one of his audience, "but we should have something that would be very good to drink.

A TORONTO watchmaker was constantly complaining to one of his workmen that he was not smart enough. "I want my work done like lightning. Here," said he, "repair that watch like a shot out of a gun," The workman complied with his master's request, and made the following entry in his work-book:—

> "Replaced a cracked jewel by cracking a joke,
> Put in a new mainspring; it's like a pig in a poke
> Escapement adjusted and cleaned from all ill,
> Please charge for this a five-dollar bill."

The complaint was not afterwards repeated.

THE English spell it "jewellery," the Americans "jewelry," a saving of two letters. The reform spelling crank puts it "julry." But whatever the spelling, the price is unaffected.

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Workshop Recipes.

GOLD TINGE TO SILVER.—A bright gold tinge may be given to silver by steeping it for a suitable length of time in a weak solution of sulphuric acid and water, strongly impregnated with iron rust.

ARTIFICIAL GOLD.—A metallic alloy, at present very extensively used in France as a substitute for gold, is composed of: Pure copper, 100 parts; zinc, or preferably tin, 17 parts; magnesia, 6 parts; sal ammoniac, from 3 to 6 parts; quicklime, $\frac{1}{8}$ part; tartar of commerce, 9 parts; mixed as follows: The copper is first melted, and the magnesia, sal ammoniac, lime, and tartar are then added separately and by degrees, in the form of powder; the whole is now briskly stirred for about one half-hour, so as to mix thoroughly, and then the zinc is added in small grains by throwing it on the surface and stirring till it is entirely fused; the crucible is then covered and fusion maintained for about 35 minutes. The surface is then skimmed and the alloy ready for coating. It has a fine grain, is malleable, and takes a splendid polish, and does not corrode.

Trade Notes.

We have received from Messrs. Crosby, Lockwood & Co., a copy of the "Compendious Calculator," by O'Gorman. It is a work which represents the interests of all trades in economising the method of calculation for all particular industries, not omitting gold and silversmiths. The fact that this is the twenty-sixth edition of the work shows that it is appreciated by the many trades it represents.

A Paris jeweller has been prosecuted for illegally practising surgery. He had pierced the ears of a child two years old, for earrings, for which he charged half-a-franc. The ear became inflamed; the inflammation spread to the neck, and the child died, the doctor attributing death to the ear having been pierced too high up—not in the lobe, but in the cartilage. The defence was that all jewellers pierced ears, and that the mother must have used some injurious lotion instead of olive oil. The jeweller was fined 50f. for homicide through imprudence, with 150f. damages to the parents.—*Standard.*

The entire plant of the Lancaster Watch Company, of Lancaster, Pa., is offered for sale by the assignee, including real estate, buildings, machinery, tools, finished and unfinished watches, drawings, patterns and patents, the total value being estimated at $300,000.

There is something remarkable in the old English eight-day clock. It has lived a long life, it has rendered good service, and in most respects its construction is almost perfect. Critics of taste are agreed that in matters of art time is the final judge, and certainly it has stood this most crucial test. Every style is the product of many minds working together for many years. It is the result of a combination, and its growth stops when the combination ceases; so that when we meet with a style of work that is worthy of notice we may be sure of finding some excellent traits of character in the men that produce such work. We have recently met with a fine specimen of an old English clock-maker, George Biddle, of 30, Winyatt Street, Clerkenwell. At the time we had the pleasure of looking through his workshop he was engaged in restoring a very fine old eight-day clock, bearing the date 1649; probably this clock struck the fatal hour in which King Charles lost his head, and yet it is going perfectly to-day. He showed us an immense amount of his work. We may mention that musical and chime clocks are with him a specialty. We hope shortly to have the pleasure of describing some of the tools and processes of manufacture he was kind enough to show and explain.

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The Science of Salesmanship.

Fine salesmanship requires brains. The mere art of selling goods is simple enough, but the knowledge of moving large quantities, of understanding how to deal with men, to make them feel well disposed, to keep up this feelnig and continue their patronage, is as much a science as any taught by scholar or studied by student.

In the first place true salesmanship requires a keen and ready insight into human nature. There are no two men alike, and each one of us has his peculiarities. It is necessary to study these peculiarities. One is jovial and hearty, and wants to treat and be treated in this style. Another is quiet and dignified, and must be handled with gloves. A third likes to chat and cannot be hurried, while his neighbour may be short and quick in his manner and anxious to get through. Some need a cigar or a drink to glide them into a buying mood, while others would take such an offer as a signal insult. Hence, the salesman must be thoroughly acquainted with all his customers, must know their peculiarities, and treat each in such a way that he will feel well disposed towards the salesman. The personal characteristics of a salesman, of course, constitute an important element. Some men possess the knack of making themselves popular, and popularity is one of the essentials in the science of selling goods. Everybody is naturally more disposed to buy of the man who has a cheerful smile and open, friendly tone, than from an unsocial, a disagreeable, or on the other hand, a fawning or flattering fellow.

One of the most important aids towards the sale of goods, is sincerity. Let the buyer be convinced that he is being dealt with in a fair and honest way, and he will not hesitate to buy liberally if he is in a mood to buy; but let there be a suspicion of trickery or underhand work, and he will be strongly influenced to keep aloof.

A conversation with one of the most successful salesmen in the jewellery line brought out some points which are worthy of mention. An evident desire to help the buyer in selecting goods and pointing out the best patterns, goes a great way. "After two or three well-posted men in the trade have looked through my line," remarked the salesman above referred to, "I can pretty well see which are going to be the popular styles, and I give subsequent buyers the advantage of the first selections and truthfully inform them that such and such patterns are taking. The result is that they obtain goods that move readily, they sell them and re-order, a superstition arises that there is luck in the goods, and they always remember me and give me a hearty welcome and a good order." Nothing will so disgust a man, as to see styles grow old upon his hands, and nothing will so injure the chances of the man who sold them in subsequent transactions. Hence, sincerity and an honest outlook for the welfare of customers are not only necessary to accomplish sales, but also the best policy in the long run. The man who has once been "stuck" and discovers it, as it will not take him long to do, never forgives the one who sold him the goods, and so the one lucky sale may prove to be the last.

A wise salesman will never enter into an argument with a customer, be it on religion, politics, or any other subject. If you disagree at the start, you are very sure to disagree just as much at the finish, and usually stir up considerable excitement and some feeling of animosity, with nothing to show for it. The safe plan is to steer clear of all forms of controversy.

We once heard the words of advice of an older brother to a young man just about to start out on the road. His counsel, well worthy of repetition, was as follows:—"First of all you must be courteous and obliging; if a man is busy, do not bother him; if there is any little favour you can do him, do it unasked. Always be as cheerful as you can—I don't mean blustering or boastful. Do not endeavour to sell him anything you know he cannot sell and another man can. When you know he has goods enough, let him alone, and above all, get his faith, so that when you say a thing, he will believe it. Always try to get a chance to show your goods; but never forget that you are a gentleman, and do not assume familiarity with people unless you really know them. If you follow these rules and have the right goods you must succeed."—*Chicago Watchmaker and Metal Worker.*

Legal.

Dowle *v.* Dicker.

THE plaintiff, described as an artist, lives at 50, Barking-road; the defendant, a pawnbroker, carries on business at 652, Commercial-road, E, and the action was for the recovery of £7 10s., the value of a gold watch left with the defendant in pledge, and damaged by reason of the defendant not taking proper care of the same whilst in his possession.

Mr. Willis, solicitor, of Stratford, appeared for the plaintiff, and Mr. Attenborough, solicitor to the Pawnbrokers' Protection Association, represented the defendant.

The defendant had paid 10s. into court as representing the damage.

The plaintiff, in answer to Mr. Willis, stated that in November, 1883, he pledged a gold watch with the defendant for £2; he purchased it in December, 1882, for eight guineas, and it was a good time-keeper. On the 25th September this year he went to redeem it, placing the ticket and £3 on the counter, the young man taking 8s. 4d. for interest. After waiting about half-an-hour the young man came back, saying he could not find it, and asked if it was in a case when he left it. Afterwards he brought it wrapped in paper, when he (plaintiff) found upon examination that the key which wound it up at the back, had been broken off, the enamel injured, the two glasses broken, and the cases quite flattened against the interior. The young man said he would send it away to be repaired. He (plaintiff) fetched it on the Saturday, but it stopped at 4 on the Sunday morning, and would not go again. He took it back on the Monday morning, when he said he could do nothing more for it, it had been there often enough, and he (plaintiff) could do his best and do his worst. A watchmaker had told him the watch was useless and not worth doing up. Its value was £7 10s.

By Mr. Attenborough: The watch did not meet with any accident whilst in my possession. I bought it at 15, Suffolk-street, Birmingham. As soon as they found the watch was broken, they snatched it out of my hands.

Richard Dowle, the plaintiff's brother, said he was a general dealer. He knew the watch to be a good time-keeper and had offered his brother £10 for it. Was with him at the time he pledged it, and it was in perfect order then. When he redeemed it, they said they were very sorry it was damaged; but knowing him to be a photographer, they would give him a turn.

Mr. Jordan, a watchmaker, said he had examined the watch and it would cost from 35s. to £2 to repair, and eight guineas would not be an excessive price for it.

Mr. Attenborough said: No doubt the watch was damaged whilst in the defendant's possession, but the only injury was that the finger was broken; there was no damage to the cases whatever, and if it did not go now, it must be from the result of some injury caused to it after it was given to the plaintiff, and the sum of 10s. paid into Court, was sufficient compensation for the injury admitted. He called two of the defendant's assistants and other witnesses in confirmation of his statement.

His Honour ultimately gave judgment for the plaintiff for 25s. beyond the 10s. paid into Court, and costs.—*Pawnbrokers' Gazette.*

Defects of Clickwork.

(Gustav Menzer, *in Alleg. Jour. der Uhrm.*)

THE correction of the clickwork pertains to the most important work of the repairer, and should receive his unqualified attention when adjusting or repairing a watch. Daily ocular proofs reveal the fact that many watchmakers are unacquainted with this part of the mechanism. The observant repairer can testify that a number of watches, otherwise yet in a good state of preservation, come under his hands for repairs whose barrel is scratched and disfigured by unskilful hands. In one, repairs have become necessary on the barrel arbor, in consequence of broken barrel teeth; another one demands a new clickspring; and these accidents originate chiefly in unsatisfactory and unskilful repairs.

The friction of the barrel arbor requires to be regulated first. Watches of the better quality have the ratchet sloping on both sides, not to injure the cap. The repairer had better do it when he finds it wanting. To do this, place the barrel arbor in the screw head tool, and slightly bevel the teeth of the ratchet with the Arkansas stone; clean the dirt from the teeth, using a ratchet file, as the dirt is apt to adhere inside, then place the barrel arbor in the bridge and screw down the cap with all the screws. When a screw does not draw well, replace it by a new one, but do not by any means try to make it fit by flattening it, or, as the writer has already met with in his practice, by riveting it. Moreover, no screw end should protrude, but must be neatly rounded off.

If the ratchet of the barrel arbor possesses too much friction, or works too hard, do not try to correct it by loosening the screws; this remedy would only be temporary, because the screws loosen themselves little by little, at every winding of the watch, and after a while would fall out altogether. Others do not correct the strong friction, but think the ratchet would learn better manners after a while, and adapt itself to circumstances; the cap is most generally injured in such a condition, and brass dust is the result, which may find its way into the movement. The cap screws, again, suffer because compelled to resist too much force, and they do not unfrequently snap off, conducive to the standing still of the watch.

If the friction of the barrel is too great or too little, either fault is best corrected on the cap; in the first case, turn out a little from the inside in such a manner that the pressure is eased, increasing the turning-out at the spot where the teeth revolve. In the second case, turn off a little from the outer surface, whereby the pressure upon the wheel is increased, and pay especial attention that the pressure exerted by the cap is located at the centre, and not upon the ratchet teeth, thus maintaining the friction without variation, and at uniform rate.

Where the friction is too great an additional deepening of the sink in the bridge cannot always be depended upon, because in many instances the barrel cannot be placed deeper, and the effectiveness of the bridge is often weakened; therefore deepen the sink only, when the barrel can be placed to better advantage. Some repairers place the cap upon a hollow riveting tool, and give it a correspondingly hollow shape; this remedy merely transfers the friction to the teeth points; by a small friction a forced or bent down cap is equally objectionable, the screws are compelled to withstand too much pressure, and are apt to fly off; the good appearance of the cap also suffers, and a turning down under the same is after all the best remedy.

When the friction of the barrel arbor is in order, take the side clickspring in hand. Why has a pin been put at the foot of the clickspring, and of what utility is it if the spring foot does not rest upon the plate or screw-hole and screws are fitting to each other, in case the screw should become loose? How few watches are seen where the screw-hole is proportioned to the screw, and where the foot pin is in condition to prevent any up or down motion of the spring. When the screw-hole is larger than the screw, the foot pin, of course, assists the screw in its effectiveness, but its true function is only to prevent the up and down motion of the clickspring. Let the repairer make it a point that the foot of the spring rests at all times upon the plate, because a deviation of its position becomes thereby impossible.

Do not allow the clickspring to have a very short foot, but try it in the following manner :—Screw the bridge upon the plate loosely, screw the clickspring in its place and try, catching at the hook, to move up or down; if it resists, the foot is suitable, if movable, the foot is too short. To remedy this fault, take a strip of brass plate, fasten it in the hand-vice, scratch it clean, wet it with soldering fluid, and let a minute quantity of tin run upon it. Next take the clickspring, scrape the lowest side of its foot, also wet it with soldering fluid, then hold the brass plate over an alcohol flame, so that the clickspring remains outside the reach of the flame; the tin will fuse in a short time without injury to the spring in letting it on. Next file the foot in a fitting shape, in such a manner that the hook closes nicely with the cap or with the bridge, and you have obtained in such a manner a clickspring which serves all the purposes for which it is intended.

Next dismount the cap, try the clickwork until the hook touches the bottom of each ratchet tooth; it must not permit the least motion to the ratchet.

In case the depthing to the clickwork is too shallow, it is better to file down the bridge than to disfigure the clickspring. To do this, screw the cap again in its place, for which purpose two screws, standing diagonally to each other, are sufficient to save time and satisfy yourself that the cap does not interfere with the functions of the clickspring; if this is the case, dismount and remedy by carefully filing; rectify it thus that the clickspring of the ratchet is kept distant from the cap by about the thickness of a sheet of paper, to permit, by a possible wear of the hook, a polishing of the spring afterwards. Should the spring be too strong, place it in the hand-vice in such a manner that the polished upper surface stands above it, to prevent any accidental injury; lay it upon a piece of wood or a cork, so that the hook may reach across over to the other side; gently draw it toward you so that the hook may imbed itself in the wood or cork, and file it thinner. When sufficiently weakened, lay it on another clean cork and give the place a nice clean appearance with the Arkansas stone.

A clickwork with click must receive the additional attention that it shall be neither too high nor too low. File down in the first case, so that the screw head rests upon the shoulder, but does not hinder the click in performing its function. If this is too thin replace it by a new one, but never shorten or lower the shoulder, to prevent an up or down motion, because if necessity should demand at some future time to put in a new one, this would have to be filed accordingly.

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Refining Sweepings.—The sweepings of the worshop contain quite a quantity of gold and silver. To 8 ozs. of the dirt, which has been washed and burnt, add salt, 4 ozs.; pearlash, 4 ozs.; red tartar, 1 oz.; saltpetre, ½ oz.; mix thoroughly in a mortar, melt in a crucible, and dissolve out the precious metals in a button.

The Practical Application of Iridium.

Within the last few years, says *Engineering*, a new industry has arisen in the manufacture of articles from iridium, through the discovery of Mr. John Holland, of Cincinnati, that by the addition of phosphorus, the hitherto intractable metal could be easily melted. Previously to the present time iridium, unless alloyed with platinum, has had substantially but one use, viz., for pointing gold pens, and for this purpose it was used in the native state, suitable pieces of ore being selected and soldered in place. The metal itself was discovered in 1803 by Smithson Tennent, while investigating the metallic residues which remained when platinum ores were dissolved in *aqua regia*. In the early history of the electric light, in 1848, W. E. Staite patented the use of iridium filaments in incandescent lamps, and proposed to prepare the metal by fusing the oxide in a cupel of bone ash under the voltaic arc. The ingot thus obtained was to be annealed in an oxyhydrogen jet, and worked under hammers and between rolls at a white heat. In certain cases thin strips of metal were to be cut from the ingoe "in the same way as precious stones are cut by the lapidary." What measures of success he obtained, if any, is not known, but he appears to have devoted the greater part of his attention to arc lamps, and probably the scheme never got beyond the paper stage. The means he indicated, however, were the only ones which attained any success, and by their aid other experiments succeeded in obtaining small globules of the metal.

About four years ago Mr. John Holland, gold pen manufacturer, found it necessary to have pieces of iridium, larger than those generally found in nature, for the purpose of making points for a stylographic pen. After many experiments he found that by heating the ore in a Hessian crucible to a white heat and adding to it phosphorus, and continuing the heating for a few minutes, he could obtain a perfect fusion of the metal, which could be poured out and cast in almost any desired shape. The product was found to be about as hard as the natural grains of iridium, and, in fact, seemed to have all the properties of the metal itself. On chemical analysis it was found that the metal fused with phosphorus contained, according to two determinations, 7·52 and 7·74 per cent. of phosphorus. For many purposes it could be used in this state without further treatment, but when it had to withstand a white heat, as in some kinds of electrical apparatus, this capability of fusion destroyed its usefulness. Experiments for the purpose of removing the phosphorus were then made by Mr. W. L. Dudley, of Cincinnati, who found that by heating the metal in a bed of lime the phosphorus could be completely eliminated. In the usual operation the metal is first heated in an ordinary furnace at a white heat, and finally after no more phosphorus makes its appearance, it is removed and placed in an electric furnace, with a lime crucible, and then heated until the last trace of phosphorus is removed; the manufactured metal will then resist as much heat without fusion as the native metal.

The principal sources of the supply of iridium are Russia and California. It is extracted from gold and platinum ores as a by-product, and is always found in small grains or fine powder, the largest pieces being about the size of a grain of rice. It is generally found alloyed with platinum or osmium. When pure it possesses a white lustre, resembling that of steel; its hardness is about equal to that of the ruby; when cold it is quite brittle, but at a white heat it is somewhat malleable. It is one of the heaviest metals, having a specific gravity of 22·38. When heated in the air to a red heat the metal is very slowly oxidised; but upon raising the temperature to about 1,000° Cent., it parts with its oxygen, and above that temperature it is not oxidised. It is insoluble in all single acids, and but very slightly soluble, when in a state of fine powder, in *aqua regia*.

According to the new system of manufacture, and in cases where the article is not subject to great heat, the metal is melted with phosphorus, and cast into the desired shape; it is then ground or worked into the exact required form.

Iridium is sawn by a copper disc 4 in. to 8 in. in diameter running at 2,500 revolutions per minute, and dipping into a bath of cotton-seed oil and corundum or diamond dust.

Many new uses are now opening for iridium since it has been possible to melt and cast it. It is used for drawplates, to replace the ruby plate, in the manufacture of gold and silver wire; for knife edges, for scales and balances; for tipping hypodermic needles, and for many other purposes. It has been tried for the negative pole of an arc lamp, and was found to keep its shape, in spite of the heat, provided the positive carbon was not allowed to strike or fall too heavily upon it. One of the most important applications is for the contact points of telegraphic instruments; these outlive many platinum contacts, and do not oxidise or stick.

Efforts are now being made to effect the electric deposition of iridium, and considerable success has been obtained by Mr. Dudley, who, according to a paper which he recently read before the American Institute of Mining Engineers, hopes to make a commercial success of this art shortly. The solution is made by mixing iridium of iridosmine with common salt placed in a tube and heated to redness. Chlorine gas is then allowed to flow slowly through the tube for several hours, at the end of which time most of the iridium has combined with the salt and chlorine to form a double choloride of iridium and sodium, which rapidly dissolves in water, and forms a solution from which other salts can be prepared.—*Journal of the Society of Arts.*

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Optics.

Continued from page 85.

We now come to the discoveries of Newton, which constitute nearly as important an era in optical science as his theory of universal gravitation did in astronomy. His researches began in 1666, when he was only twenty-three years of age.

In hopes of improving the telescope, by giving to the glasses a figure different from the spherical, he had procured a glass prism, in order, as he tells us, to try with the "celebrated phenomena of colours." These trials led to the discovery of the different refrangibility of the rays of light, now too well known to require to be particularised.

Having admitted a ray of light into a dark chamber through a hole in the window-shutter, and made it fall on a glass prism, so placed as to cast it on the opposite wall, he was delighted to observe the brilliant colouring of the sun's image, and not less surprised to observe its figure, which, instead of being circular, was oblong in the direction perpendicular to the edges of the prism, so as to have the shape of a parallelogram, rounded at the two ends, and nearly five times as long as it was broad.

When he reflected on these appearances, he saw nothing that would explain the elongation of the image but the supposition that some of the rays of light, in passing through the prism, were more refracted than others, so that the rays which were parallel before they fell on the prism, being some of them more refracted than others, diverged from one another after refraction, the rays that differed in refrangibility differing also in colour. The "spectrum" would thus consist of a series of circular images, partly covering one another, and partly projecting one beyond the other, from the red, or least refrangible ray, in succession to the orange, yellow, blue, indigo and violet, the most refrangible of all.

But he did not adopt this as the true explanation till he had tried every other hypothesis by the test of experiment and proved the fallacy of each. Even after these rejections his explanation had still to abide the sentence of an *experimentum crucis.*

Having admitted the light, and applied the prism as before, he received the coloured spectrum on a board about twelve feet distant from the prism, and pierced with a small hole. The coloured light which passed through this second hole was made to fall on a prism, and afterwards received on the opposite wall. It was then found that the rays which had been most refracted by the first prism were also most refracted by the second, though no colours were produced. It was also observed that when the rays which fell on the second prism were all of the same colour, the image formed by refraction was truly circular and of the same colour with the incident light.

When the sun's light is thus admitted, first through one aperture and then through another at some distance from the first, and is afterwards made to fall on a prism, as the rays come only from a part of the sun's disc the spectrum has nearly the same length as before, but the breadth is greatly diminished, in consequence of which the light at each point is purer. It is free from penumbra and the confines of the different colours can be more accurately traced. It was in this way that Newton measured the extent of each colour, and taking the mean of a great number of measurements, he assigned the following proportions, dividing the whole length of the spectrum, exclusive of the rounded terminations, into 360 parts. Of these the

Red occupied	45 parts
Orange ,, ...	27 ,,
Yellow ,, ...	48 ,,
Green ,, ...	60 ,,
Blue ,, ...	60 ,,
Indigo ,, ...	40 ,,
Violet ,, ...	80 ,,

Newton conceived that there was an identity between these numbers and the division of the monochord by the notes of music. But it has since been observed that the spaces occupied by these colours differ according to the kind of prism employed. Hence the relation was merely accidental.

Thus colours were found to be original properties of light, connected with the different degrees of refrangibility belonging to the different rays. Each of these colours, though primary, may be produced by a mixture of the two colours upon either side of it in the prism. Red and yellow make orange; yellow and blue make green, and so on. In general two colours not very far distant in the natural series, when mixed, make up the intermediate colour. All of them, together, constitute whiteness. Natural bodies of whatever colour, if viewed by simple and homogeneous light, are seen of the colour of that light and no other.

Thus, supplied with so many new and accurate notions respecting colours, it was natural for Newton to apply them to explain the rainbow. Everything respecting that beautiful phenomenon had been already explained except the colours. As these colours were the same as in the solar spectrum exhibited by the prism, and in the same order, it could hardly be doubted that they were owing to the same cause. He showed this to be the case by calculating the extent of the arch, the breadth of the coloured bow, the position of the secondary bow, its distance from the primary, and by explaining the inversion of the colours.

As all colour comes from the rays of light, we must conclude that the colour of every particular body is owing to its reflecting the particular kind of ray of which it exhibits the colour. If you cast upon a coloured body a homogeneous ray of light, it appears much more vivid, that is, it reflects much more light, when the ray cast upon it is of its own colour. Transparent bodies sometimes reflect one kind of ray, and transmit another.

But here a difficulty occurs. Suppose a body to reflect red or green light. What is it that decomposes the light, and separates the red or the green from the rest? It was this difficulty that led Newton to study the colours produced by light passing through thin plates of any transparent substance. When two transparent bodies, such as pieces of glass, having their surfaces somewhat convex, are pressed together, a black spot is formed at the contact of the two, which is surrounded with coloured rings more or less regular, according to the form of the surfaces. To analyse this phenomenon, Newton made experiments with surfaces of a regular curvature, capable of being measured. He took two object-glasses, one a plane convex for a fourteen feet telescope, the other a double convex for one of about fifty feet, and upon this last he laid the other, with its plane side undermost, pressing them gently together. At their contact in the centre was a pellucid spot, through which the light passed without suffering any reflection. Round this spot was a coloured ring, exhibiting blue, white, yellow and red. This was succeeded by a pellucid or dark ring; then a coloured ring of violet, blue, green, yellow and red, all copious and vivid except the green. The third coloured ring consisted of purple, blue, green, yellow and red. The fourth consisted of green and red; those that succeeded became gradually more dilute and ended in whiteness. It was possible to count as far as seven.

The colours of these rings were so marked by peculiarities in shade and vivacity, that Newton considered them as belonging to different orders, so that an eye accustomed to examine them, on any particular colour of a natural object being pointed out, would be enabled to determine to which order in this series it belonged.

Thus we have a system of rings or zones surrounding a dark central spot, and themselves alternately dark and coloured; that is, alternately transmitting the light, and reflecting it. It is evident that the thickness of the plates of air interposed between the glasses at each of those rings, must be a material element in the arrangement of this system. Newton, therefore, undertook to compute their thickness. Having carefully measured the diameters of the first six coloured rings at the most lucid part of each, he found their squares to be as the progression of the odd numbers 1, 3, 5, 7, &c. The squares of the distances, from the centre of the dark spot to each of these circumferences, were therefore in the same ratio, and consequently the thickness of the plates of air, or the intervals between the glasses, were as the numbers 1, 3, 5, 7, &c. When the diameters of the dark or pellucid rings, which separated the coloured rings, were measured, their squares were found to be as the even numbers 0, 2, 4, 6, &c., and therefore the thickness of the plates through which the light was wholly transmitted were as these numbers.

The curvature of a convex glass being the thickness of the plates of air which corresponded to the different rings was computed. An inch being divided into 178,000 parts, the thickness of the air for the first series, or for the luminous rings, was $\frac{1}{178000}$, $\frac{3}{178000}$, $\frac{5}{173000}$, &c., inch. For the second series $\frac{2}{178000}$, $\frac{4}{173000}$, &c., inch.

When the rings were examined by looking through the lenses in the opposite direction, the central spot appeared white, and in other rings red was opposite to blue, yellow to violet, and green to a compound of red and violet, the colours formed by the transmitted and reflected light being what are now called complementary, or nearly so, of one another, that is, such as when mixed produce white.

When the fluid between the glasses was different from air, as when it was water, the succession of rings was the same, the only difference was, that the rings themselves were narrower.

When experiment was made on a thin plate, in such a way that the plate was denser than the surrounding medium, as in the case of soap-bubbles, the same phenomenon was observed to take place.

To the different degrees of density, then, in transparent bodies, there seemed to be attached the powers of separating particular colours from the mass of light, and of rendering them visible sometimes by reflection, and in other cases by transmission. Now, as there is reason to think that the atoms of bodies are transparent, they may be conceived to act on light after the manner of thin plates, and to produce, each according to its thickness and density, its appropriate colour, which therefore becomes the colour of the surface.

But these experiments led to other conclusions, new and unexpected. It was impossible to observe without wonder the rings, alternately luminous and dark, that were formed between the two plates of glass in the preceding experiments, and determined to be what they were by the different thickness of air between the plates, and having to that thickness the relation already specified. A plate, of which the thickness was equal to a certain quantity multiplied by an odd number, gave always a circle of the one kind; but when the thickness was the same quantity multiplied by an even number, the circle was of another kind; the light, in the first case being reflected, in the second, transmitted.

Light penetrating a thin transparent plate, of which the thickness was m, 3 m, 5 m, &c., was decomposed and reflected; the same light penetrating the same plate, but of the thickness 0, 2 m, 4 m, &c., was transmitted, though in a certain degree also decomposed. The same light, therefore, was transmitted or reflected according as the second surface of the plate of air through which it passed was distant from the first by the intervals 0, 2 m, 4 m, or 3 m, 5 m; so that it became necessary to suppose the same ray to be successively disposed to be transmitted and to be reflected at points of space separated from one another by the same interval m. This constitutes what Newton called fits of easy transmission and easy reflection. It constitutes one of the most singular parts of his optical discoveries. It is a necessary inference from the phenomena, and though the cause cannot be assigned, it must notwithstanding be admitted as a general fact, which enables us to explain various phenomena that were unknown at the time when Newton lived.

Newton's explanation of refraction proceeds on the theory that light is an emanation of particles moving in straight lines with incredible velocity, and attracted by the particles of transparent bodies. When, therefore, light falls obliquely on the surface of such a body, its motion may be resolved into two: one parallel to that surface and the other perpendicular to it. Of these the first is not affected by the attraction of the body, which is perpendicular to its own surface, and therefore it remains the same in the refracted as it was in the incident ray. But the velocity perpendicular to the surface is increased by the attraction of the body, and whatever be the quantity of that velocity, its square on entering the same transparent body will always be augmented by the same quantity. But it is easy to demonstrate that if there be two right-angled triangles, with a side in the one equal to a side in the other, the hypothenuse of the first being given and the squares of their remaining sides differing by a given space, the sines of the angles opposite to the equal sides must have a given ratio to each other. This amounts to the same thing with saying that, in the case before us, the sine of the angle of incidence is to the sine of the angle of refraction in a given ratio. This explanation of the law of refraction is so satisfactory, that it affords a strong argument in favour of the system which considers light as an emanation of particles from luminous bodies.

Huygens, indeed, deduced from the hypothesis of the vibrations of an elastic fluid an explanation of refraction which is highly ingenious, but not quite so satisfactory as the Newtonian ; though it is the fashion at present to give a preference to the hypothesis of Huygens, we think that very solid objections might be started against it, were this the proper place for such an attempt.

The square that is added to that of the perpendicular velocity of light, in consequence of the attractive force of the transparent substance, is properly the measure of the quantity of that attraction, and is the same with the differences of the squares of the velocities of the incident and the refracted light. This is readily deduced from the ratio of the angle of incidence to that of refraction. When this is done for different substances, it is found that the above measure of the refracting power of different bodies is nearly proportional to their densities, with the exception of those which contain much combustible matter, which is always accompanied by an increase of refracting power.

Thus the refracting power (ascertained in the way just mentioned), when divided by the density, gives quotients not very different from one another, till we come to combustible bodies, when a great increase immediately takes place. In air, for instance, the quotient is 5,208, in rock crystal 5,450, in common glass nearly the same; but in spirits of wine, oil, and amber, the same quotients are 10,121, 12,607, 13,654. In the diamond he found the quotient 14,556. Hence he conjectured that the diamond was, at least in part, a combustible body. The refracting power of water being great for its density, its quotient being 7,845, he concluded that an inflammable substance enters into its composition—a conjecture which was verified nearly a century afterwards by the synthetical experiments of Mr. Cavendish.

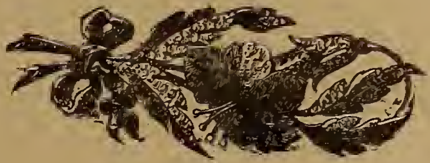
The reflection of light from the surfaces of opaque bodies, and from the anterior surfaces of transparent bodies, appears to be produced by a repulsive force exerted by those surfaces, at a determinate but very small distance, in consequence of which there is stretched out over them an elastic web, through which the particles of light, notwithstanding their incredible velocity, are not always able to penetrate. In the case of a transparent body, the light, which when it arrives at this network is in a fit of easy reflection, is reflected back again. The particles, on the other hand, which are in a state that disposes them to be transmitted, overcome the repulsive force, and entering the transparent body, are attracted and refracted as already explained. If these rays reach the second surface of the transparent body with a certain obliquity, the attraction will not suffer the rays to emerge into the rarer medium, but will force them to return back into the transparent body. Thus the reflection of light, at the second surface of a transparent body, is produced, not by the repulsion of the medium into which it is about to enter, but by the attraction of that which it was going to leave.

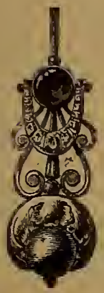
In consequence of these discoveries Newton perceived a defect in the refracting telescope proceeding from the unequal refrangibility of the different rays. This defect he was of opinion it was impossible to remedy, because he thought that the quantity of the refraction and of the dispersion in different substances bore always the same ratio to each other. Had this been so the appearance of prismatic colours in a refracting telescope could never have been cured without destroying the refraction altogether. But this was one of the few points about which Newton was mistaken. The mistake was afterwards discovered by Dollond, who found that by means of crown and flint glass the dispersion might be counteracted without injuring the refraction. This great discovery enabled him prodigiously to improve the refracting telescope, and they are now reckoned so much preferable, that they are superseding the reflecting telescope altogether. Newton turned his attention also to the inflection of light. He found that the ray, in passing the knife-edge, had been both attracted and repelled, and that it had begun to be acted on at the distance of $\frac{1}{800}$th of an inch from the edge of the knife. The path of the ray, in passing the knife-edge, was bent in opposite directions, so as to form a serpentine line, convex and concave, towards the knife, according to the repulsive or attractive forces which acted at different distances. In his opinion the refraction, reflection, and inflection of light are all produced by the same force, differently modified, and do not arise from the collision of light with the particles of bodies.

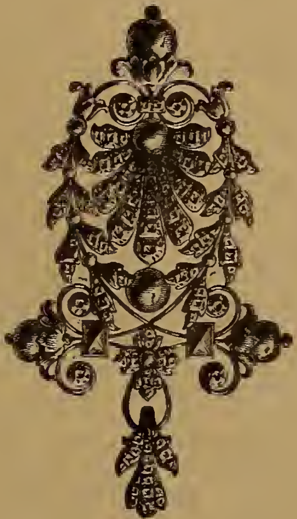
The great improver of achromatic telescopes, after Dollond, was Frauenhafer. He observed, in examining the different coloured rays of the spectrum by means of a telescope, that though the coloured spaces appear not parted by any distinct boundaries, yet they are broken and subdivided by numerous white and black lines. He reckoned altogether about six hundred lines. A few occur in the red, but they are numerous in the orange, yellow, green and blue. A stripe, opened by a fine white line, divides the red, other stripes emerge at intervals between the orange and the blue, and two very broad approximating bars cross the violet. Other glass prisms, and even those filled with liquids, gave similar appearances. It would appear from this that refraction proceeds by irregular bounds, somewhat like Newton's easy fits of transmission and reflection.

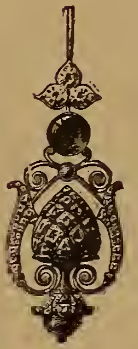
We shall finish this hasty sketch of optics with noticing the discovery of what is called polarized rays of light by Malus, a French officer of engineers. The double-refracting property of Iceland-spar, which had been so carefully examined by Huygens, drew also the attention of Newton, who concluded that the ray which suffers the unusual or extraordinary refraction must have its opposite sides affected by some virtue like magnetism, which gives them a tendency to polarity. This remark lay neglected for almost a century. Malus had early turned his attention to the more difficult problems in optics, and after his return from foreign service he resumed his favourite studies. In one of his frequent visits to the Observatory, during his residence in Paris in the summer of 1809, he was struck with the brilliant reflection of the setting sun from one of the windows of the Luxembourg Palace. On looking at the appearance through a prism of rock-crystal, which he slowly turned round, he remarked with surprise that one of the images changed regularly to brightness from obscurity. Next morning he repeated his observation with the same results, and soon found that light, reflected at a certain angle from the surface of glass, acquires the same character as the extraordinary ray in the double-refracting prism. Water showed a similar disposition, but at a different angle of incidence. The law was traced through various reflecting surfaces, and Malus was prosecuting the subject with rapid success when his career was cut short by a lingering disease, on the 23rd of February, 1812. The subject of polarization has been successfully prosecuted in this country by Herschell and Brewster, and on the Continent by Biot, Arago and Fresnel, but much still remains to be discovered before it reaches the perfection which characterises the other branches of optics.

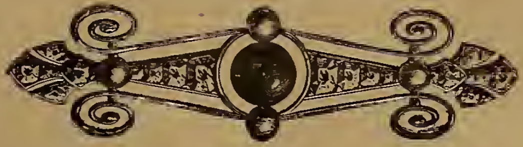
MONTHLY SUPPLEMENT OF DESIGNS.











THE WATCHMAKER JEWELLER AND SILVERSMITH

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ILLUSTRATED SUPPLEMENT:—"Designs for Modern Jewellery."

Silver Trade.

THE burning question of to-day is, what will the two millions of enfranchised agricultural labourers do with their vote? Speculative answers are rife on every side. The interest is without bound. Will some of these men seek to enter the political arena? Will all take an active part in discussing the questions that come before the Legislature? I trow not. If they are wise men their attention will for the most part be directed to such measures as relate to the agricultural interests of this country, and seek for men of ability and integrity to represent them in Parliament. The men whose hands are horny with labour and that have long ministered to our necessities will, we doubt not, be quite equal to the circumstances in which they have been placed.

The most important part of philosophy is that which relates to the immediate sphere and business in which we live, and the right for these men to take an active part in the electorate makes them responsible in the government of the country, and to complain of unfair or imperfect legislation is in effect to bring home the charge of negligence to those to whom this vote is committed. We have not, like Milton, to fight for the freedom of the Press, or like Wat Tyler, to contend against an obdurate monster whose extravagance compels him to encroach upon our rights. Our trade difficulties are of our own creating, and whatever is defective in our laws, we are doubtless responsible for the defect. The desire to take an active and an intelligent part in the government of the country has long been a characteristic of the inhabitants of these islands. But it is doubtful if we are sufficiently active in attending to trade legislation. Parliament is powerless to deal with these questions in which there is a want of unanimous thought and action on the part of those employed, whether as labourers or capitalists. It seems to us desirable to open a trade parliament in the pages of this journal for the full discussion of the silver plate question with special reference to the future of hall-marking, and the principle best adapted for the modern requirements of the trade. We shall be willing to give an honorarium of one guinea for the best paper which may be submitted on either side of the question (not more than 800 words), written by a member of the trade who is thoroughly practical.

In this journal we keep a broad platform that will admit of free and full discussion, without fear or favour. The course of debate is as follows:—Two principal speakers holding opposite views on the question are selected by the editor to open the debate. Readers are then invited to express their own views upon the subject. It will be the editor's duty to act as Mr. Speaker, consequently, while preserving due order in the discussion he will not be held to endorse any opinions that may be expressed on either side, each debater being responsible for his own views.

◆

Wise or Otherwise.

MR. PUNCH caution the parents and guardians of precocious boys that show a tendency to inventiveness:—"Thomas Treadwell was always reckoned a very Ingenious Boy. While still very young, seeing other boys with boats, while he had none, he converted his Sunday hat into a circular iron-clad, with a newspaper for a sail—and his barque behaved nobly. Thomas also converted the mainspring of his father's watch into machinery for the lock of a brass cannon, and being in need of a saw, made a very fine one with his father's razor, which he nicked in the edge with a piece of the drawing-room window-pane.

"Come to Manhood, Thomas remained a Great Boy, and laid out all his property on his own useful inventions. He discovered a machine for writing Leading Articles, but this only caused him to be hated and insulted by the Gentlemen whom his cleverness deprived of their livelihood. Later, Thomas devised a mechanical Member of Parliament for the Representation of Minorities. This was a great saving of trouble, as the mechanical Member, on being wound up, almost always went into the right Lobby and voted straight, while the Government of the day, by regulating the works, could make him alter his course in any direction. Finally Thomas produced and patented two mechanical self-feeding Wastepaper Baskets, with dust-bins complete, which he proposed to substitute for the Colonial and Foreign Offices. About this invention he received a most flattering letter from Prince Bismarck, who said that he found these new inventions quite equal to the old-fashioned English articles then in use. But public prejudice was stirred up against Thomas, and the War Office neglected his plan for "giving the enemy snuff" in patent soft-coated explosive shells, recommended by the Peace Society.

"By this time the money of Thomas was spent, and he had to develop his Self-steering Dynamic Balloon in the retirement of Colney Hatch, where he is one of the most respected inmates. Parents and Guardians will observe the results, in the way of honours and rewards, that may be won by encouraging inventiveness in the young."

◆

WE regret to have to announce the death of one of the most able, useful, and respected members of the watch trade. Mr. Moritz Grossmann died suddenly from apoplexy of the brain, at Leipsic, on the 23rd ult., shortly after delivering a lecture. In our next issue we shall give our readers a full and authentic biography, with portrait, of the deceased author of the prize "Essay on the Lever Escapement."

The Art of Metal-Working.

(Continued from page 100.)

FROM that time most of the artists took up engraving as a branch of Art. Filippo Lippi is said to have engraved an "Annunciation" and a "Crucifixion." Next, Sandro Botticelli set himself in 1481 to illustrate Dante, and to print his idealisations of the Sibyls and Prophets; but not having sufficient command over the graver, he availed himself of the assistance of Baccio Baldini, a goldsmith. Baldini only supplied the hands for the mechanical part, the whole spirit of Botticelli is in the designs. The Sibyls are so full of poetic mysticism and grace, that they are perfectly charming. The engraving is so fine and clear that not a line is unnecessarily placed. So much were these engravings admired, that his first plates were worn out and had to be re-engraved to produce the requisite number of copies.

Andrea Mantegna, inspired by the engraving of the Florentine Masters, took up the new art with great interest, and began to reproduce in print his grand cartoons of the "Triumph of Cæsar," but he had not time to complete the series. Several of his smaller prints remain to us, however, and display the same semi-classic style as his paintings; the technical excellence is very great. Perhaps his "Entombment of Christ," and "Descent into Limbo" are the finest compositions, being full of a melancholy grandeur; some of the figures, especially the Virgin, and St. John, are most majestic. His "St. Sebastian," on the contrary, is a model of youthful elegance.

Mantegna formed a large school of engraving, but his scholars are more remarkable for close adherence to their master's style and peculiarities than for any originality. They excelled, however, in ornamental engraving, their scrolls and arabesques being surprisingly beautiful; the antique models and casts of Squarcione's school, no doubt, gave them inspiration in this branch. The practice spread to Venice through Mantegna's artistic intimacy with Giovanni Bellini, and it became a custom for Venetian artists to make engraved copies on copper of their own paintings.

In the cabinet of engravings in Paris, are several early Venetian prints by Giralamo Mocetto, and by Giulio Campagnola, father of Titian's pupil, Domenico.

While the art of Steel engraving was thus making progress in Italy, the Germans were not behindhand. From the early date of some of their prints—those of Erhard Schön bearing the dates 1466 and 1469—we may judge that the art developed itself there independently of the Florentines.

Martin Schonganer (born after 1420), was a contemporary of Finiguerra, and gained fame by his fine engravings, not only in his native country but also in Italy, where he was called "Il Buon Martino," his fellow-countrymen called him Martin Schön. Indeed, it seems doubtful whether the rise of the art in Italy was not influenced as much by his works as by Finiguerra's niellos. A certain Martin van Cleef sent a great number of prints to Florence in the fifteenth century, which Vasari attributes to Martin Schonganer, but the signature M. C., is sufficient to identify them, Schonganer always signing his Ma. S. The prints described by Vasari were chiefly Scriptural subjects, one of which, the "Crucifixion," was so beautiful that Gherardo, a Florentine artist, engraved a fac-simile. Another, a St. Anthony carried in the air by a number of devils, so pleased Michelangelo for its *bizarre* originality that he painted it.

After Schonganer came that king of engravers, Albrecht Dürer, artist and goldsmith, a man whose fame is for all time. Endowed with a vivid imagination and a stern love of truth, Dürer's works are the strongest mixture of fact and fancy ever produced. Full of mystic meanings and deep sentiment, they are, nevertheless, the most perfect realistic productions known in art. Ignoring the axiom that "Art is Beauty," he takes as his motto "Art is Truth," and where the subject demands expression in ugliness, he fearlessly reproduces the most repulsive faces and figures. He is, perhaps, the greatest proof of how material art would have become without the influence of classic feeling, and how much less enobling is an art which reproduces nature slavishly, with all her defects—mostly caused by a mode of life opposed to nature's laws—than the art which dedicates itself only to that which is beautiful and good in nature.

Apart from his want of appreciation of the beautiful, Dürer was technically one of the finest engravers that ever lived, every outline firm and correct, the effects of light and shade expressed in the finest possible lines, and in the meaning always high. His "Melancholy," and the "Knight, Death, and the Devil," reveal the mystic depth of his imagination, while in his "St. Eustace" (St. Hubert), he gives us the poetry of loneliness in mountain landscape. In landscape he has a peculiarly mediæval touch, being fond of ancient castles and austere wild mountain scenery, and a style of foliage more conventional than natural. It would be superfluous to trace the list of Dürer's followers, the long line of "Little Masters," who for generations filled the collections of German Art patrons with quaint, but finely executed prints. Many of the "Little Masters" came to Italy to study, and so brought a slight degree of freedom into their designs.

The sixteenth century produced in Italy a still larger number of engravers. The invention of printing had created a demand for this style of illustration, the old illuminations, beautiful as they were for the written books, proved quite unadapted to the need of reproducing many copies at one time. The Aldine Press, in Venice, employed several artists to engrave initial letters and illustrations for their exquisitely printed books. Among the principal engravers of this time were Francia (Francesco Raibolini, of Bologna), and his scholar, Marc Antonio Raimondi; also Giovanni Battista del Porto, of Modena.

Francia, as we have said elsewhere, was famous as a goldsmith before he began to paint, and his favourite pupil in this followed him, Francia's works in niello were almost as fine as those of Finiguerra, and perhaps more artistic, his forte being in design. A beautiful pax by him is in the Bolognese Academy. In the centre is a niello scene of the "Crucifixion," two angels fly, poised in air, at the side of the Saviour, the weeping Madonna and St. John are at the foot of the Cross, St. Jerome and St. Francis kneel behind, and a wide landscape background completes this miniature picture. Above is a Pietà with two Angels. Francia was employed by his patron, Giovanni Bentivoglio, in November, 1508, to make the dies for the Bolognese coins. They had the likeness of Pope Julius II. on one side, and the arms of Bologna on the other.

Marc Antonio Raimondi (born about 1475, died 1534), after assisting his master in niello and other goldsmith's work for several years, turned his attention almost exclusively to engraving; after having seen and copied the prints of Albrecht Dürer, for which there was a *furore* amongst Italian artists. He had great facility in the management of the burin, and was famous for his beautiful designs for waist-belts and other adornments in niello.

On leaving Francia he went to Venice, where he found employment, probably as an illustrator of books; after which he proceeded to Rome, where he engraved some of Raphael's designs. One of these, the "Lucretia," is a perfect masterpiece of engraving. Not less fine is the "Judgment of Paris," a composition crowded with fantastic detail. The "Murder of the Innocents," the "Neptune," surrounded with stories of Æneas, and the "Rape of Helen," are splendid studies of figure drawing. So pleased was Raphael at the skill of Marc Antonio and the justice he rendered to his own designs, that he wished him to engrave all his drawings, and he placed one of his pupils, called "Il Baviera," under Marc Antonio for instruction in the management of the burin. The list of works which came from the joint studio is endless; they were generally signed R. S., for the designer's name, and M., M.A., or A. M. F., for the engraver's.

Raimondi formed a large school of engravers. Chief of his followers we may name Agostino Veneziano (signature A. V.) Marco da Ravenna, who engraved for Raphael, and signed R. S., or M. R. (Marco Ravignano). He was killed in the sack of Rome, 1527. Jacopo Caraglio, though he turned his attention more to engraving precious stones, is known as the engraver of several works of Raphael, Rosso, Parmigiano, Titian, and Pierino del Vaga. Niccola Rosase, commonly known as Nicoletto da Modena, engraved from about 1500—1512, after the works of Mantegna, Martin Schonganer, Albrecht Dürer and others. The brothers Giorgio and Teodoro Ghisi, of Mantua, and some Germans, Beham and Pentz, who came to Italy to perfect themselves in art, were also scholars of Raimondi.

Marc Antonio prostituted his talent in engraving some coarse designs for Giulio Romano, to which Pietro Aretonio composed sonnets more obscene than the picures. Giulio Romano escaped to Mantua, and all the weight of the Pope's displeasure fell on Marc Antonio, who was imprisoned, and the prints and books suppressed. On his exit from prison Baccio Bandinelli employed him to engrave his "Martyrdom of St. Lawrence," in which he took on himself to correct Baccio's bad drawing, to the great chagrin of the artist. In the sack of Rome the engraver lost his all, and escaped from the plundering hands of the Spaniards with bare life.

It was not long before engravers found easier methods than the intaglio with the graver.

Ugo da Carpi illustrated several of Raphael's designs in chiaroscuro by a process of his own, using two blocks of wood—one for the large masses of black colour, the other for the engraving itself—so that the shadows seemed etched over a black ground. In the hands of a good artist this is very effective. This Ugo must have been an original genius, addicted more to the curiosities of art than its legitimate uses. He painted in oil without a brush, substituting his fingers for that instrument. One of his paintings is preserved in the Sacristy of the Beneficiati in San Pietro, Rome, and bears this inscription "*Per Ugo Carpi inta gliotare, fata senza penelo.*" It was Michelangelo's opinion, expressed to Vasari when they were at mass one day in the chapel of the Valto Sacro, where it was then placed, that it would have been a better picture if he had used the brush. One of Ugo's best engravings is the "Diogenes with a plucked Fowl," which has been attributed to Parmigiano, who not only adopted this chiaroscuro method of engraving with two wood blocks, but taught it to his scholar Antonio da Trento, or Antonio Fantuzzi (born at Trent about 1508, died after 1550), who afterwards left his master to go to Paris, where he was known as Maître Fantose, and painted at Fontainbleau under Primaticcio.

The best engraver in this style was Domenico Beccafumi (1486—1551), who put the same principles of chiaroscuro on a gigantic scale in his floor of Sienna Cathedral. One of his engravings is a curious impersonation of alchemy. Jupiter, and the other gods are trying to solidify Mercury, who is dancing in a crucible, with Vulcan and Pluto as fire-tenders.

Parmigiano also was the first Italian who adopted the method of etching on copper with aquafortis, which Battista

Vicentino, Battista del Moro, and some German Masters brought to great perfection.

Giovanni Jacopo Caraglio (1498—1570), though more known as an intagliatore of gems, rose to eminence by his beautiful engravings on copper, in which he was an imitator of Marc Antonio. Some of his mythologic engravings from the designs of Il Rosso are very marvellously executed. He engraved also for Titian and Parmigiano. After him a long line of engravers haunted the studios of artists, and gave reproductions of their works to the world; among them we may name Giovanbatista Mantovano, and Eneas Vico, of Parma. He was famous for his portraits of great personages, and for a book of fac-similes of Roman coins and medals, and another of national costumes. Also Giorgio Ghisi, a Mantuan, spoken of above (born 1520), who is famous for his print of Michelangelo's "Last Judgment," and some works of Raphael, as well as for his beautiful metal works in relief and niello.

Another branch of art in metal-working was that applied to medals and coins, which in the fifteenth century took a form as artistic as every other appliance. Indeed, at that time Art was a kind of Midas; it turned all it touched, not to gold, but to beauty. For the inauguration of artistic medals we must look to Vittore Pisano (born about 1380, and died 1456), who, although bred as a painter under Andrea del Castagno, and associated in some of his frescoes with Gentile da Fabriano, won his greatest fame as a medallist.

The Classic revival touched each man according to his tastes. Pisano turned his attention to Roman medals, and revived that style of historic art which preserves in a small form the likeness of a famous man and the memory of his achievements. Thus he perpetuated the names of Leonello d'Este, Lord of Ferrara, Sigismondo Malatesta, of Rimini; Filippo Visconti, of Milan; Francesco Sforza, at Cremona; Giovan Francesco and Lodovico Gonzaga, of Mantua; and Alphonso V., of Aragon. All these are medals worthy to rank as works of art with the finest sculptures.

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Progress of Technical Education in France.

(*From the "Warehousemen and Drapers' Trade Journal."*)

THE authorities representing the Government of France and the city of Paris have concluded, after due investigation, that a commercial museum might be organised with advantage and annexed to the Conservatoire des Arts et Métiers. This museum would contain, not merely archæological information, but models of all the manifestations of industrial life in France and abroad. Two large galleries constructed—the one in the Rue du Verti-Bois, and the other in the Rue Vaucanson—would hold all these specimens, and might become a useful complement to the School of Arts and Manufactures. Many years have now elapsed since the Chamber of Commerce has demanded that some such institution should be created, and it is ready to subscribe a large sum towards the expenses. The State would also help to cover the outlay, so that the city of Paris will probably not have to pay for more than the cost of expropriating the inhabitants of the streets where the future museum will be built. It is scarcely necessary to point out the importance and the utility of such a museum. As a centre for information, reference, and the study of all relating to commerce and trade, it will render the greatest services, particularly if care is taken to develop the sections devoted to the progress accomplished abroad. The French are notoriously indifferent to what occurs beyond their own frontiers, and this is the cause of their defeats in many foreign markets. But, with such a museum to help to concentrate experience, something will be done tending to mitigate this defect.

This is not, however, the only direction in which our neighbours are seeking to improve their technical knowledge and skill. At Aubusson, the centre of the carpet trade, the National School of Decorative Arts has opened free classes specially adapted for the preparation of pupils destined to work in the local manufactories. There are classes for girls as well as boys, and these comprise all forms of drawing, together with the chemistry of colours and dyes. The girls are further taught embroidery, and the State has contributed £600 towards the maintenance of these classes. At present there are seventy-four male and seventy-six female pupils, which is considered a fair number for the small population of Aubusson.

At Rennes a new school of art in iron and wood was opened on the 1st of January, 1885, where apprentices from the age of thirteen to sixteen will be taught if they can show that they have already received a sufficient primary and general education. At St. Etienne, the members of the Council General, the Municipal Council, the Chamber of Commerce, and the town Fine Arts Commission, have all agreed that the Local School of Designs should be converted into the "Local School of Industrial Arts." The establishment thus enlarged will comprise classes of design drawing—elementary, medium, and superior. Then there will be classes of geometry, descriptive geometry, perspective, anatomy, art history, decorative composition, and water-colour painting, moulding and sculpture, architecture, engraving, physics and chemistry, theoretical dye work, practical dyeing, geometrical designs, mechanics, heating, weaving, and carding. To defray the expenses of all this teaching, the Municipal Council are already in the habit of giving £1,000 a year, the Chamber of Commerce and the Council General of the department will now also contribute, while the State will double the sum derived from local sources. St. Etienne is not, however, the only town that will be able to boast of an institution of this description. In Roubaix, the French Bradford, a similar school has long existed to the great benefit of local trade. The standard of teaching at Roubaix has steadily progressed, and the diffusion of technical knowledge becomes more and more general.

Such are a few of the more recent and important efforts made in France to develop technical education. There are naturally many other institutions besides those just mentioned; we have only alluded to the latest manifestations of the movement, omitting, however, the Union Central des Arts Décoratif as being too vast an enterprise to be described in a few lines. This institution, which may be qualified as the French South Kensington, has now not only its periodical exhibitions, its permanent museum, but an official organ. *The Revue des Arts Décoratif.* This admirable magazine, published every month by A. Quantin, the art printer, gives beautiful drawings and photographic illustrations, reproducing those designs and objects of art that are most useful educationally. The text is also well worthy of notice, as it is supplied by some of the ablest and most enlightened authorities on these topics. Finally we may reproduce a few figures that will denote forcibly how great are the efforts made to spread good taste among the producing classes. Thus, for instance, there were in Paris ten years ago, 203 different schools of drawing subsidised by the city. From 1874 to 1884 the number of schools increased to 437, and instead of eighty professors there are now 182; while the pupils have increased from 14,000 to 27,000. The cost for the teaching of drawing alone amounted to £2,400 in 1862, which increased to £10,160 in 1874, and £37,440 in 1884. Such expenditure must tend to improve the taste and skill of the industrial classes, and therefore to benefit trade. In these days of acute and universal competition every measure of this sort must be carefully noted; and when the results are good, either imitated or improved upon. We are constantly hearing of the delicacy of the French taste, and the demand for French fashions is universal; it is therefore essential to study the means our neighbours employ to foster this taste, which is one of their happiest characteristics.

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International Factory Laws.

THE project for an international factory legislation, which has been so eagerly advocated by Herr Emil Frei, the Swiss Ambassador to the United States, and opposed by Professor Cohn, on the ground of the difficulties arising from the varieties of national character and habit, has been taken up by the German Party, a People's Party in Austria. The able organ of that Party, which has risen of late years to a leading place amongst the daily journals of Vienna, the *Wiener Allgemeine Zeitung,* warmly commends the scheme to the working-class societies in Austria as a topic for their councils. The Governments of Europe, it grants, are not yet ripe for so forward a step as "the federation of the world." The Swiss working-class societies unanimously commend the project. The Trades Unions in France and Germany have it still under discussion, and at the last *Arbeiter Tag,* or Workmen's Diet, at Brünn, it was enthusiastically commended. The Austrian *Volkspartei,* says the Vienna journal, "is now framing its new political programme, not with a view to the wishes of this or that Government, but solely with a view to the real needs of the people. It can only redound to its honour if it boldly enters the scheme of an International Factory legislation upon that programme." It is in factories, more than any other arena of modern work and life, that the differences between nationalities disappear most quickly and completely. The machines are the same—at all events, wherever there is sufficient capital to command the best machinery—and the machines determine the character of the product and mode of production. "The machinery does not accommodate itself to the workman," says the Vienna paper, "but the workman whatever his national or individual peculiarity, must accomodate himself nowadays to the machine which rules his labour." We might add that there is already a very remarkable international legislation practically at work, in English factories, at all events, and it is notably the cause of a great deal of complaint. Germans, Belgians, Poles, Italians, and Frenchmen are at work by thousands in England; and if they obtain work in English factories, they must do so under English factory legislation without any exemption being made for this or that foreigner, on the ground of his peculiar national character or habits. The workman, whatever his nationality, conforms to the factory legislation which is in force in the land to which he has emigrated. There cannot possibly be a greater difference between any two nationalities than there is between the Pole of Posen, in Eastern Germany, and the Teuton of Elsass, in Western Germany, yet the workmen of both these varieties work under one and the same German factory legislation. In political life different nations may preserve a certain distinct and independent originality; but in economical life, on the contrary, the tendency of modern commerce and industry is to produce a sort of international uniformity. Every economical measure taken by a great commercial or industrial State affects every other State in the world, more or less. The very word "commerce," if it be taken to pieces, as the late Professor Maurice used to assert, will bear witness that nations and peoples are constantly aiming at peace, good understanding, and fellowship one with another, whereas their Governments may be aiming at the very reverse.

Horological Institute.

THE fifty-third half-yearly General Meeting of the Members of the British Horological Institute was held on Tuesday the 20th ult; we append Balance Sheet for the year ending 31st December, 1884:—

Income.	£	s.	
To Balance at Bankers' and in Treasurer's hands, Jan., 1884	675	15	4
,, Annual Contribution, City and Guilds Institute	350	0	0
,, Annual Contribution, Goldsmiths' Company	50	0	0
,, Annual Contribution, Clockmakers' Company	10	10	0
,, Donation, Drapers' Company	52	10	0
,, Donation, Marquis of Northampton	10	0	0
,, Subscriptions	235	17	10
,, Sale of Journals, and Advertisements	332	1	11
,, Fees, Technical Classes	131	16	0
,, Letting of Rooms	28	1	0
	£1876	12	1

Expenditure.	£	s.	d.
By Ground Rent, Rates, Taxes, and Insurance	113	10	3
,, Salaries, Wages, and Commission	590	16	0
,, Journal Expenses	193	3	3
,, Drawing Class Prizes	5	0	0
,, Time Signals	3	3	0
,, Stationery, Stamps, &c.	15	1	9
,, Tools and Materials, Technical Classes	65	19	5
,, Heating, Cleaning, and General House Expenses	30	2	4
,, Printing and Advertising	15	10	0
,, Sundries	6	3	2
,, Building and Furnishing New Class Rooms	833	5	0
	£1871	14	2
Balance:— Cash with Treasurer	4	17	11
	£1876	12	1

NEW CLASS ROOMS ACCOUNT.

	£	s.	d.
To Donation, Goldsmiths' Company	500	0	0
,, Donation, Drapers' Company	52	10	0
,, Donation, Marquis of Northampton	10	0	0
,, Amount transferred from Funds of Institute	270	15	0
	£833	5	0

	£	s.	d.
By Payment to Builders	612	18	0
,, Payment to Architect	36	15	0
,, Payment for Benches	113	0	0
,, Payments for Lighting, Heating, and other Fittings	70	12	0
	£833	5	0

We have examined the above statement, together with the Books and Vouchers, and certify it to be correct, this 15th day of January, 1885.

(Signed) W. G. Schoof, } *Auditors.*
L. T. Plose, }

The British Horological Institute has just held its half-yearly meeting. The report shows it has 451 members and that its expenditure for the year ending December 31st, 1884, is no less than £1,872 5s. 10d. Considering present depression and the great falling-off in Clerkenwell-manufactured watches, these gentlemen have cause for mutual congratulation. When this Institute was first established, the trade in Clerkenwell was comparatively prosperous, yet it had a hard struggle for an existence, sometimes not knowing where the next quarter's rent, or the next number of the Journal, was to come from; but now that the trade, which it is supposed to foster, has almost gone, the Institute, phœnix-like, enjoys all the prosperity it can wish, and by parity of reasoning may we not predict that when the last vestige of the watch manufacturing trade shall have left the British Isles, this Institute will then assume the proportions of a full-fledged bird. These facts lay bare a weak point in English character, viz., a tendency to trust too much in the work of a society.

May we not assert that the great and good charters in Church and State, in trade and commerce, have not been the work of a society, but have been accomplished by single-handed men.

So far as we can gather, the report shows that the pupils attending the classes are few in number, and that very little has been accomplished at an enormous cost.

We are not going to approach this subject in a carping spirit. Who can tell if in this little crowd of pupils there is not a bright Whitworth who shall by his genius revive the trade and make the outlay, great as it is, a safe investment? Nor are we going to let this opportunity pass without recording our admiration of the munificence of the members and friends of the Institute. Surely it is without parallel. If English Horology can stand this, it can stand anything. It is remarkable that the watch manufacturers of Clerkenwell, have for half a century, opposed watchmaking by machinery, chiefly on the ground that a plant of machine tools incurs a great outlay; and yet *they* have built up in the centre of their parish the most costly piece of horological machinery in the world. Verily it is the unlikely thing which happens!

Let us hope that the Institute in the future will be as prolific of good results as improved appliances in watch manufacturing are at the present time.

The Kimberley Mines.

By Max Pemberton, B.A.

REFERRING in a late issue to diamond mines, reference was made to the celebrated and, comparatively speaking, recently discovered Kimberley mine. It may perhaps not be entirely without interest to take a slight review of the discovery of 1870, which has led to the finding of so vast an amount of hidden wealth, and which has enriched and beggared so many a hard toiler of the soil.

The romance of mining has ever afforded food for the novelist, the sudden change of state for the poverty stricken hero, whom fickle fortune directed to some goodly gold mine, some diamond-studded ground, or, as in recent romances, the gushing ile, does not seem to be so very romantic, when we consider that what was in 1870 a small elevated bank of ground covering in extent but eight acres, in the present day turns out year by year diamond produce to the value of two or three millions. The countess with the sparkling bracelet, the rich banker's wife with the glittering necklace, never once think, as they contemplate the marvellous gems, what untold misery and joy may have been reaped by the toiler in South Africa or elsewhere, for nowhere can we imagine abject misery so soon turned into transporting joy, as in that small spot of ground, the home of the diamond.

Let us for a moment or two suppose ourselves to have started in the year 1871, with the general herd that then made so great a rush for the new discovery; and ere we set out for Natal let us look at the way the diamond was first hit on in the then deserted regions of Kimberley.

The romance of the find is commonly supposed to be this. A trader in the course of business had come down country as far as the Vaal River. There he passed the night with one of the settlers, who might be met with in those days scattered hither and thither around the uninteresting country.

Hospitality, it may be remarked, is universally extended in this country by the farmers to any traveller that may be *en route*. The trader saw the child of the settler playing with some bright stone. "What have you there, my child?" said the trader. "Only a common stone," said the child, "there are plenty of those about here." The trader, strongly suspecting the stone to be a diamond, bought it for a very small sum from the settler; and taking it to a judge in Natal, was promptly assured that it was a diamond. Following this comes the rush to the Vaal River. It was here that the first stones were found, and these have always retained their reputation for brilliancy of quality, although smaller than those found in the subsequently discovered fields.

The discovery on the Vaal River naturally created a rush, and with the rush the surrounding country was sounded, with the result that diamonds were discovered at Bultfontein, Dutoitspan, and De Beers. At these places the yield of stones was very large, but the crowning success of all was the discovery of 1871 at Colesberg Koppie, as it was called in the earlier days, but since known as the famous Kimberley Mine. Among astonishing facts surrounding this wonderful wealth store, perhaps the greatest of all is that the mine covers an area of about nine acres only, beyond this little space not a solitary stone can be found.

Had we arrived with the discovery of this mine, we should have first pegged out a claim; a claim is a small portion of this nine acres, generally about thirty feet square. At the first instance these claims were worth about £100 as an entrance price; but much smaller sums were paid than this. The hardships of the first diggers were terrible; water was so scarce that a bucket-full was as munificent a gift as the last dregs of a flask in the desert. Enough to take a bath in was beyond the dreams of even the most hopeful.

It would be impossible to convey to the reader the picture of half-naked men, dwelling in bell tents, searching each spadeful of the red sand, never knowing but that the next would give to them a magnificent prize, or another thrust on the downward path of hope. Many stories might be told of terrible deeds of bloodshed, but one only can we find space for.

A young digger had gone out almost penniless; fortune had for him large prizes; he was about to return home a wealthy man, to marry the girl who had so patiently followed him in his poverty. He was found in his tent one morning with his skull cloven in half with a hatchet. Terrible tales will always surround such situations as these, which afford such glorious prizes and such bitter disappointments. Of course all this is changed now; there is a regular town at Kimberley, and all the claims are in the hands of companies.

A few words must suffice on the nature of the soil, the quality of diamonds, and the first methods of washing and finding them.

The soil on the surface at Kimberley was red sand intermingled with limestone, now it is hard blue clay. At first the sand was simply carried from the mines and washed, and then having been passed through two sieves, was sorted on tables. Now, owing to the hard nature of the clay in which the stones are found, it has to be put on floors, the rain causing it to undergo a process akin to the slacking of lime, then washing machines are used after the fashion of those in the Australian gold mines. The diamond, being of greater specific gravity will sink to the bottom, so that of, say fifty loads put into the machine, but a wheelbarrow full will remain to be sorted. Of the quality of the stones it might be just mentioned that those of the Vaal River, as before stated, are the best. Each place seems to yield a stone of a different class. Those at Bultfontein are small but of good colour; though many are spotted, Dutoitspan yields some of good colour and large size, as also does De Beers; but Kimberley is far at the head in the respect of quantity.

Much might be written of the journey from Natal, anecdotes of the sharpness of the natives, and of the missionaries, might be quoted in abundance. Perhaps our good editor may be able to afford space for these on another occasion.

Correspondence Column.

THE NEW METHOD OF MEASURING TIME.

TO THE EDITOR OF THE "WATCHMAKER, JEWELLER, AND SILVERSMITH."

Sir,—I noticed in your issue of January 5th an article on the above subject. While, on the whole, the writers quoted in that article seem to approve of the 24 o'clock system, it appears to me that they have failed to point out one of its chief objects.

In itself the 24 o'clock system will in the long run prove of great advantage, not only to scientific men, but to the general public in all the countries where it is now to be adopted. It is, however, when we look at the question of time reckoning from a world-wide, or cosmopolitan point of view, that we see the full advantage to be derived from the system.

The present mode of reckoning time is according to the longitude of places on the earth's surface, hence, unless where the places are in the same longitude, the local time at every place on the earth's surface, differs from the local time of every other place, at the same moment of absolute time. In the present age, when all portions of the habitable globe are being occupied by civilised communities, and brought into constant communication by steamboat, railway, and electric telegraph, such a state of things can only lead to needless complication and confusion. The introduction of a system of cosmopolitan time becomes, therefore, a matter of pressing necessity. The giving up of the custom of dividing the day into halves of twelve hours, each half numbered from one to twelve, prepares the way for such a system.

The unit measure taken for cosmopolitan time, is the mean period occupied by a revolution of the earth on its axis in relation to the sun; a period precisely equal to the mean solar day. This unit measure is divided into twenty-four equal parts, and these again into minutes and seconds. The twenty-four parts into which the time unit is divided, although each exactly equal in length to an hour, ought not to be considered hours in the ordinary sense, but simply twenty-fourth parts of the mean time occupied in the diurnal revolution of the earth. Hours, as we usually refer to them, have a distinct relation to noon or to midnight at some particular place on the earth's surface, while the time indicated by the cosmopolitan system has no special relation to any particular locality or longitude. It is common and equally related to all places, and the twenty four sub-divisions of the unit measure are simply portions of abstract time. The meridian selected for the zero of the sub-divisions is 180° east and west of Greenwich, consequently, cosmopolitan time is identical with the local time of Greenwich. That is to say, when it is 12 o'clock by Greenwich time, it will be 12 o'clock by cosmopolitan time at every place on the earth's surface. But although 12 o'clock, it will, nevertheless, be noon only at those places which are on the meridian of Greenwich. Now as the position of the sun in every local sky will always control domestic usages, and continue to govern social customs, we cannot expect that local time reckoning will be given up. How then can we derive any practical good from the advantages which, as a theory, the system of cosmopolitan time appears to promise?

In every country local time is more or less arbitrarily established; it could not be otherwise without causing great confusion, as no two places, unless on the same meridian, have the same true local time. For instance, Greenwich time is used all over England and Scotland, although at some parts of the west coast of the latter country the true local time is as much as forty-five minutes slower than Greenwich time. Now if each place take, as a standard for its local time, the nearest of the twenty-four fixed meridians which are at one hour's distance from each other, we have at once a means of employing cosmopolitan time in conjunction with local time, without seriously altering the present arrangement of things, and without the necessity of using two distinct sets of time-keepers.

In Great Britain, France, Spain, Algeria, Timbuctoo, Ashantee and St. Helena the local time would be the same, and would coincide with cosmopolitan time. In those countries then, the stationary clocks, and the watches of those of the inhabitants who remain at home, would require no alteration. In Iceland, Madeira, Canary Islands, Senegambia, Sierra Leone and Ascension Islands, the local time, while alike as regards each other, would be one hour behind the local time of the former countries, and consequently one hour behind cosmopolitan time, that is to say, when it was noon in Great Britain, France, etc., it would be 11 o'clock in Iceland, Madeira, etc., according to local time, while according to cosmopolitan time it would be 12 o'clock at all places. The clocks and watches in the latter countries therefore would require a second dial for cosmopolitan time, which would indicate 12 o'clock when the local dial indicated 11 o'clock, and it is obvious that if the two dials were fixed in that relation to each other, the hands of the clocks and watches moved by the same clockwork would continue to indicate correctly both local and cosmopolitan time for the whole round. Again in Spitzbergen, Sweden, Berlin, Naples, Malta, Tripoli, etc., the local time, while alike as regards each other, would be one hour before the local time of Great Britain, France, etc., and consequently one hour before cosmopolitan time. The cosmopolitan dials, therefore, of the clocks and watches of these places would be set to indicate 12 o'clock when the local dials indicated 13 o'clock, and the clocks and watches would then continue to indicate both local and cosmopolitan time. In places two hours before or behind Greenwich, the cosmopolitan dials would be set to indicate 12 o'clock when the local dials indicated 14 o'clock or 10 o'clock respectively, and so on all round the world.

The two dials might in the case of watches be placed back to back, and in clocks side by side; or the figures representing cosmopolitan time might be placed within those representing local time, on the same dial and with the same hands to show both. Then to distinguish the one from the other, the figures for cosmopolitan time might be white on a black ground and the local figures black on a white ground, or *vice versa*. A better plan, however, would be to use letters instead of numerals to represent cosmopolitan time, as is done in this country at present for the purposes of telegraphy. In sending time by telegraph the hours are indicated by the symbols for the letters of the alphabet, leaving out the letters *J* and *Z*. Midnight being represented by *Y*, 1 o'clock by *A*, 2 o'clock by *B*, and so on to 12 noon, which is represented by *M*, 13 o'clock (or 1 p.m., old style), by *N*, 14 o'clock by *O*, and so on.

Suppose *Y* to be the letter representing the zero of the cosmopolitan unit measure, *A* the next meridian one hour from zero, *B* the next two hours from zero, and so on, and suppose the cosmopolitan time to be *M* o'clock, it would then be 11 o'clock in Iceland, Madeira, etc., 12 o'clock in Great Britain, France, etc., 13 o'clock in Spitzbergen, Sweden, etc. and so on, according to the local time of these countries.

The watches, and other timepieces, which are to be used by persons travelling beyond any particular local time section, would have the numerals for local time inscribed in a movable disc, adjustable for each separate hour; while the letters for cosmopolitan time would be on the fixed dial. The adjustment would be effected without in the least disturbing the machinery of the instrument, or interfering with the index hands. Suppose, for example, we leave England and go to Berlin on meridian *L*, 12 (noon) placed in conjunction with *L*, would complete the adjustment of the instrument, and the hands (while showing the new local time), would continue to indicate correct cosmopolitan time.

The advantage of having a system of time reckoning common to all nations, are by no means of slight importance, although, perhaps no one whose experience has been confined to the United Kingdom, can form an adequate idea of the extent of the inconveniences arising from the want of such a system. The case of England may afford an illustration; before the introduction of railways in England, every town and village kept its own time. A person travelling in those days, would find his watch differ more and more from the local clocks as he proceeded from place to place. On the establishment of the railway system this state of things could not be tolerated. The railways demanded a uniform time, and Greenwich time was used. This was looked upon in many places as an innovation, and was for a considerable period opposed; but at last the advantages of a uniform time became so manifest, that Greenwich time came into general use. Among the several objects which the scheme of cosmopolitan time has in view, not the least important is to extend to the world similar advantages to those which have been conferred on England, by the general adoption of Greenwich time, and the 24 o'clock notation paves the way for such a scheme.

Without doubt many objections will be urged, as was the case when England adopted Greenwich as a time standard, but these, like the others, will ere long be forgotten. One of the objections (mentioned in your article already referred to), against the 24 o'clock system as recorded on the new dials, where the afternoon hours are shown on an inner circle, was that the watch would not show whether it was 1 o'clock or 13 o'clock, 2 o'clock or 14 o'clock, and so on. This could easily be met by asking, did the old watches show whether it was 1 a.m. or 1 p.m., 2 a.m. or 2 p.m., and so on. In both cases alike, external evidence has to be used, and no difficulty is experienced in deciding which hour is indicated. A very neat, effective, and cheap way of adapting existing watches to the 24 o'clock system, is to have the figures for the inner circle lithographed on thin paper, which can easily be gummed on to the dial. Already the watchmakers in this district are selling these gummed supplementary dials at a cost, I believe, of a penny or twopence.

I am, Sir, Yours faithfully,
William D. Sang.

Kirkcaldy, N.B., 26th January, 1885.

THE SILVER TRADE.

TO THE EDITOR OF THE "WATCHMAKER, JEWELLER, AND SILVERSMITH."

Sir,—"Old Hand," rightly says that the odd piece of law-making which found its way into the Revenue Bill last year, "for ever sets aside all pretext for compulsory hall-marking in Great Britain." I agree with him also, that "it behoves the trade well to consider under what new regulations" the hall-marking of the future is to be conducted.

It may be as well for your readers to understand the lines upon which the agitation for reform will hereafter be conducted.

First, the duties must be abolished, as "Old Hand" properly says, "for ever." The licences must also be abolished.

Secondly, hall-marking must be made a voluntary institution. There are some forty unrepealed Acts of Parliament affecting the question. They must, one and all, be swept away, and a new Act must be passed for the following purposes, viz.—

(*a*) To protect all ancient marks, the word "ancient" to apply to all plate marked prior to the passing of the said Act.

(*b*) To re-create the various Assay Offices, as at present existing, with power to add to, or to diminish their number.

(*c*) To require the Assay offices to register their marks under the Trades Marks Acts.

(*d*) To require the Assay offices to mark all goods of standard quality which may be brought to them, at certain fixed charges.

(*e*) The "scrape and parting assay" to be used only in the case of unfinished goods, or goods in dispute; the "touch" being used in the case of all finished goods.

(*f*) No goods to be broken up.

(*g*) Halls to be perfectly self-supporting; fees, therefore, to be adequate to such self-support.

(*h*) The word "standard" to apply to gold of 18 carats fineness, and silver of the present standard of 11oz., 2 dwt., to the pound Troy.

(*i*) Penalties for forgery and malpractices.

(*k*) The marks hereafter to be used to be those only of the maker, and the mark indicating gold or silver; query, the "lion passant" for silver, and the "leopard's head crowned" for gold?

(*l*) Plated goods not to be allowed to be marked, excepting by a registered "trade mark" of maker.

(*m*) Provisions for uniformity of practice at the various Assay Offices.

The great object should be for perfect freedom of action on the part of manufacturers and dealers. If the former make, or the latter import goods of standard quality, an official mark will be obtainable guaranteeing that quality,—a mark not obtainable for goods of inferior quality.

This should, and in all probability would, raise the standard of jewellery manufactured and sold, while at the same time it would maintain the present high standard of silver plate in its integrity. It should, and in all probability would increase our exports of plate and jewellery to all parts of the world.

Whether Birmingham will regard with equanimity the proposal to abolish hall-marking (now voluntary) of low standards of gold, remains to be seen.

The reform party do not pledge themselves to this scheme to the letter, but after long consideration it has been decided not to be contented with anything less than this:—there is an alternative, of course (and it should be remembered that the Board of Trade favours this alternative), viz., to abolish all the Acts of Parliament, together with all the Assay Offices, and simply to place the trades in the precious metals upon a level with all other inoffensive trades.

Darwinian disciples may also favour this alternative, which being interpreted, means "the survival of the fittest." Even then, to my mind, the situation would be in no degree alarming.

Yours, &c.,
Edward J. Watherston.

Pall Mall East.
February 1, 1885.

DIAMOND END PIECES.

TO THE EDITOR OF THE "WATCHMAKER, JEWELLER, AND SILVERSMITH."

Sir,—In your January issue, Mr. Whittaker writes against the diamond end-stone being used for the balance-cock. He says:—

"If there is a mechanical advantage in placing it in the balance-cock, why not put a diamond end-stone to cover the foot hole of the balance also; and in like manner make diamond end-covers to the scape-wheel and pallets also?"

I think there are more reasons than one why the balance-cock should have a diamond end-piece.

(i.) Most watch wearers lay their watches down on the bottom cover when they are not worn, the balance-cock end-piece being thereby used and not the foot end-piece.

(ii.) The friction at the balance-staff pivot ends, is much greater than that at the pivots of either the scape or pallets.

(iii.) The weight of the balance is greater than that of the pallets or scape wheel.

This should prove that it is not only for "eye service" a diamond end-piece is used.

Several watches that I have repaired have had a small pit worn in the centre of the ruby or sapphire end-stones of the balance-cock jewel cover, but these wears did not appear on those of the scape or pallets, though they were of the same quality; and I have never seen them on a diamond end-piece.

Yours obediently
L. T. PLOSE.

32, Store Street, London.
January 28th, 1885.

TO THE EDITOR OF THE "WATCHMAKER, JEWELLER, AND SILVERSMITH."

SIR,—We recently sent to the Kew Observatory, six movements, without preliminary trial, numbered respectively 2201 to 2206.

They were entered to gain any certificate that their performance warranted, and at the end of the forty-five days' trial three were awarded the A certificates, and the three others the B certificates.

We have the authority of Mr. Whipple, the superintendent, for saying that this is the best result as yet obtained at the Kew Observatory for a number of watches submitted together, and may possibly be of interest to the trade.

Yours truly
(Signed) BAUME & Co.

21, Hatton Garden, E.C.
January 22nd, 1885.

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Prize Essay on the Going-Barrel.

THE prize of £50 so generously offered by Mr. A. Fischer for the best "Essay on the Going-Barrel" has, by the unanimous vote of the judges, been awarded to Mr. J. Herrmann, and as soon as the necessary engravings have been executed the publishing of the essay will commence in this journal.

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Trade Notes.

THE *Illustrated London News* says: — Diamonds have diminished in value of late years since they have been found in South Africa. [This is hardly correct; at the present time fine stones fully maintain their value. The fall in price is confined to off-coloured and imperfect stones which are so abundant in Cape diamonds], and the value of other gems has risen in proportion. It is well known that the most splendid pearls in the world belong to Madame Gustave de Rothschild, and that the historic rubies of the house of Nassau are owned by Madame Nathaniel. Madame Euphaussi also has some magnificent rubies; and Mrs. Mackay has an enormous one, for which she paid £12,000 to Boucheron, of the Palais Royal. The Duchess of Edinburgh and the Prince De Bearn also have splendid sets of rubies.

THE twenty-four hours system is now upon its trial. It has been in vogue a month or a little more, and is beginning to be taken up in sound reality. First, it caused a good deal of joking, and since then, men have begun to adopt the inevitable, and face the new order of things with a grace and good feeling that betoken ultimate adoption. It is becoming customary already—although at first it looks very strange to see concerts announced to take place at 20 o'clock, auction sales to take place at 13 o'clock, and appointments are being frequently made, half in jest and half in sober earnest, for all sorts of double time from 13 to 24, and thus the new system is spreading,

BAD TRADE.—Never, in our experience, have so many reports of depression reached us from all parts of the world. We desire to remind our readers that there is a bright side even to this gloomy picture, just as times of prosperity are not always an unmixed blessing. In times of *adversity* we are led to *consider*, to *retrench expenses*, to *practice economy*, to *suggest* and mature *new plans* of usefulness. When storms are blowing, the fisherman, who is afraid to venture in his frail bark, is diligently employed mending his nets and improving his stock of tackle, knowing well that the wave-beaten shores will soon be visited by shoals of fish in search of the food that is stirred up by the action of the water. In like manner, the great threatened convulsions which now affect the commercial world will, it is to be hoped, soon subside, and trade winds will again visit our land.

MR. SYDENHAM, jeweller, of Frederick-street, Birmingham, who had been staying at the Kent Hotel, Ryde, Isle of Wight, went to bed late on Wednesday, January 14, leaving his cases of jewellery in the stock room. On the following morning when the "boots" was about to take the cases to the railway station it was found that they had been broken open and all the gold rings, chains, lockets, etc., to the value of £800 abstracted, only silver articles being left. The thieves are believed to have slept at the hotel, and probably left by the earliest boat for Portsmouth in the morning. A hundred pounds reward has been offered.

THE *Daily Telegraph* of January 14th, says that at a meeting held in the Racket Court, Bath-street, Birmingham, last night, it was stated that there was estimated to be over 20,000 unemployed working men in the town. It was also stated that the brassfounding, gun, and jewellery trades were the most distressed, thousands of working men in them being unable to obtain employment. The gun trade, both military and sporting, was said by some gunmakers to have entirely left the country, while the jewellery trade was described as never having been in a condition one-tenth as bad as at present.

MESSRS. JOHN SMITH & SONS, of Derby, have recently completed three contracts by adding to the undernoted churches turret clocks of their usual well known workmanship. At Alton and Rolleston churches, in Staffordshire, the clocks have two dials facing south and west, and strike the hours on a large bell. Also at the church at Helpston, Peterboro', the same firm have erected a clock striking the hours upon a large bell, and which has a large dial. They are all fitted with the latest improvements and are not expected to vary more than fifteen seconds a month.

MESSRS. NEWSOME & Co., of the Butts, Coventry, are about issuing a new catalogue and price-list containing some good lines for their well known make of English lever watches of every description. We especially recommend those of our readers who are not in receipt of one, to at once send in their names and addresses as only a limited number will be sent out. The same firm have also patented a special watch-dial under the twenty-four hours system, an illustration of which will be given in our next issue.

Although the trade is sufficiently well informed as to the efficiency of Messrs. Birch & Co's Patent Self-adjusting Watch Keys, yet many of our readers will do well to apply for a catalogue recently issued by them, as it contains numerous additions likely to be of interest to the trade generally.

Mr. J. Herrmann has just brought out in pamphlet form, his opening lecture viz., "Reasons for our Mode of Practice," given at the Polytechnic School of Watch and Clockmaking, on October 3rd, 1884. Copies may be obtained at the office of this journal.

In the Navy estimates for 1884-85 chronometers are estimated to cost £1,432.

Jewellers complain of the slackness of trade, and hail the advent of a ready-money customer with much rejoicing and thankfulness. Such a windfall happened to a certain manufacturer in Warstone Lane a few Saturdays ago. The proprietor himself was out, but his son transacted the business in his absence, and had the pleasure of handing to his father a little cheque for £100, in payment for goods selected and carried away. The gentleman had also taken with him a ring of the value of £35 on approval, and "hoped to do further business later on." The day being Saturday, and near closing time, the cheque was carefully locked in the safe, and sent to the bank on Monday with other moneys. The same cheque was duly returned by the bankers with the laconic note, "No effects." The gentleman, who is a German, with a common Teutonic patronymic, is not to be found at the address he gave, and is probably, at the present time, several miles away from Birmingham. He had a good start; but there are other jewellers who would try, even now, to catch him, if they could get upon the scent, and Mr. B. J. Westwood, Warstone Lane, would be in the hunt.

Foreign Items.

By R. Fischer.

From Pforzheim, the centre of the German jewellery industry, reports are very unsatisfactory. It is true there has been an extension in the number of factories, and more workmen are employed; but this increase of production has naturally led to stronger competition, and consequently cutting of prices and smaller profits. It appears that the bulk of the business has been done without adequately paying for capital and labour. Pforzheim has no doubt tasted some of the evils which have so sadly affected Birmingham, that is, starting business with a ridiculously small capital, and giving too much credit, and the results are bound to be the same. Wages are, of course, lower than they were during the prosperous years following 1870. The value of precious metal consumed in the manufacture of jewellery is estimated at about £650,000 for gold, and £55,000 for silver, a small increase only on the previous year.

The Chamber of Commerce of Pforzheim reports as follows, on the export business of jewellery:—

"The regular sales to which we had formerly been accustomed exists no more; trade has, on the contrary, been subject to important and sudden fluctuations in almost every market. Orders have only been given when immediately required, thus allowing the manufacturer not sufficient time to admit quiet, regular, and lucrative work. Buyers, at the same time, continually reduced prices until it became almost impossible to supply current goods. To this must be added also, the constant demand for new models, quite out of proportion to the transactions.

Formerly if a certain style had once been accepted, the sale of it was certain for a considerable time, and it was thus possible to draw all the profit from the models, dies, etc.; besides, the workman acquired greater skill, and it was possible to make the work profitable. Now it is an understood thing, that, with exception of the commonest class of goods, the same design is not to be supplied twice. There is a craving for novelties, something not seen before, and this has a most baneful influence on good taste, good work, and the manufacturers' profits. This state of affairs is all the more unsatisfactory because prices are already calculated too fine, owing to the changes in the management of the trade during the last few years. In the past the export trade was in the hands of a few first class houses with ample resources; now we have, instead, a great number of small firms, who want to treat direct with buyers abroad, and lack the means for properly carrying on such a trade. The consequences are evident; besides reducing prices to extreme limits, sales are often effected, in times of embarrassment, at ruinous rates, thus greatly injuring regular and solid business. The only remedy for this dangerous state of things would be to establish here large commission houses, such as have been founded, for the same reasons, in other large commercial centres as in Paris, for instance. These commission agents should serve as intermediaries between buyers and sellers, to the advantage of both.

Speaking of the export trade to Austria-Hungary, the same Chamber of Commerce says:—

The sales to these countries have been normal, as regards both 14 carat gold and silver-plated goods. To Trieste 18 carat and 13½ carat articles have also been exported. Pesth, the capital of Hungary, also sells 18 carat jewellery, but 14 carat is in principal demand at that place. At one time the retail houses were visited by travellers from Pforzheim, while now the wholesale houses are almost exclusively dealt with. The Austrian Government is very strict in the exercise of the gold control, numerous complaints are made from all directions, and it appears that the authorities proceed with a regrettable want of consideration, quite exceeding the necessities, and greatly injuring the legitimate interests of the trade. Valuable articles have been broken up, which would quite stand assay, even if tested in various parts. We quite agree with severity in test, but this could be done without recklessness. To be quite sure that 14 carat goods will not meet with destruction, the manufacturer must give at least 14¼ carat to goods destined for Austria. Payment in these countries is slow but sure; legal proceedings require now many more formalities than formerly, and are at the same time more costly."

Several manufacturers of Pforzheim devote themselves now solely to the manufacture of plated jewellery, but of a different character to that produced in France and the United States. In the latter countries imitation jewellery is made of bronze plated with gold, while in Pforzheim the gilding is applied to a silver base. The reason for this mode of manufacture is that if fine silver be employed, it can be exported to Austria as silver gilt, and stamped with the silver mark. This branch of the jewellery trade has also the advantage of a much greater demand, and is less exposed to fluctuations.

The small island of Jersey is comparatively a good customer for clocks and watches. The imports of this class of goods are something like £12,000 sterling. We owe the following statistics to the *Moniteur D. L. B.*

Clocks	£3,300
Pendules	1,700
Gold Watches	3,570
Silver Watches	3,120
Movements	216
Materials	94
	£12,000

These imports are divided between the following countries :—

	Clocks.	Watches.	Pendules.	Movements.	Material.
England	£380	70	675		
United States	1,342	...	383		
Germany	1,133	...	292		
France	335	1,630	2,725	204	96
Switzerland	110	...	2,625		
	£3,300	1,700	6,700	204	96

It will be seen from these statistics that France is the principal source of supply, Switzerland and the United States coming next. Trade in English manufactured goods seems to be small, being of high class only at prices which render a large sale in such a market impossible. It must, however, not be forgotten that almost the whole of the supply, be it of French, Swiss or American origin, reaches the island through the London market.

According to the *Impartial*, the Bureau of Control of St. Invier, stamped during 1884, 8,094 gold cases, 11,870 silver cases, or a total of 126,802. This shows a diminution of 647 gold and 869 silver cases on the year 1883.

All the Swiss papers report a most unsatisfactory state of affairs in the watch trade. The new year brought no improvement on the bad business of last autumn. Failures and compositions seem to attract all the attention for the present, and throughout the trade there is a most uneasy feeling. The *Pays* of Porrentrug says :—" A large concern has just stopped payments in Chaux de Fonds, and it is feared that another large establishment in the Jura is seriously affected by this failure." The crisis seems to be as general as it is disastrous. At Bienne the situation is equally grave, and three establishments are reported to have reduced their prices by 25 per cent. The same cry comes from Lode.

At the same time Swiss manufacturers, through their Associations, neglect nothing which might improve their hold upon present markets, and acquire new ones. The consuls of the Swiss Confederation, resident abroad, are called into requisition, resulting in reports which are most useful, and worthy of imitation by our agents, who hold similar positions in the interests of the United Kingdom. The society of Jewellers and Silversmith of Geneva has lately received from consular agents, beyond the seas, reports not only brimming full of useful hints, but even designs suitable to the taste of the respective countries to which they are attached.

Birmingham is not the only jewellery manufacturing town which suffers from great depression. From reports which appear in this Journal, taken from our foreign contemporaries and private information, it will be seen that in almost every country, in which the manufacture of jewellery has any importance at all, much stagnation and unprofitable business exists. These reports contain many useful hints, and are worth the attention of our manufacturers.

In a previous number of this Journal we gave the statistics of the French export trade, and we now bring before our readers details of the importation for the first eleven months of the past year.

	1884	1883.
Gold plate, platinum and enamel	frs. 383,600	frs. 386,000
Silver ware	1,690,710	1,824,055
Gold and platinum jewellery ...	21,143,600	20,816,400
Silver jewellery	5,324,210	5,991,150
Imitation jewellery	38,116,166	39,606,514
Electro plates	1,089,183	1,146,816
Cut coral, unmounted	592,992	262,848
Coral, rough	463,420	534,766
Pearls	25,585	74,791
Lockets, imitation stones, glasses, etc.	310,960	223,808
Silver and metal watches ...	1,098,438	391,468
Gold watches	345,580	426,920
Watch movements	75,083	260,887
Clocks	4,296,940	6,251,407
Carillons and musical boxes ...	158,253	144,357
Clocks in wooden cases... ...	1,449,432	1,342,736
Watch and Clock movements ...	1,607,870	2,004,804
Materials	5,317,090	6,185,927
Bronzes	7,449,321	9,422,729
Imitation bronzes	27,557,559	33,890,013
Statuettes	70,872	2,790
Optical and scientific instruments	6,856,896	8,108,937
Eye glasses	464,006	577,632
Watch and optical glasses ...	399,330	260,100
Crystals	22,950	
	126,310,146	140,137,855

There is thus a falling off in the import trade of 13,827,709 frs. that is over £500,000 sterling.

Another fact worth noticing is, that in 1884 there were 116 insolvencies in the Watch and Jewellery trade alone. Much of the depression in trade is however ascribed to the cholera scare, a statement which no doubt is correct to a certain extent. The new year seems to have opened more satisfactorily and manufacturers are hopeful.

The coral industry is reported as reviving. This is no doubt owing to the great taste which Parisian jewellers display in making up this material in combination with many varieties and colours of metal.

Operations in diamonds are very restricted, although fine stones command attention. Most jewellers reserve their purchases until February, and the sales now effected are principally in small brilliants and roses.

Tunis is becoming quite an important market for jewellery. From the 13th of November to the 12th of December last, that is in the space of a single month, jewellery to the extent of 141,035 frs. has been imported from France alone.

Two companies for the importation and exportation of jewellery have just been formed in Paris, each with a capital of £20,000. They trade under the following names :—L. Lartigne and Co., rue Richer 22; and Levi, Lion and Co., rue des Petites-Ecuries 13.

Scotch jewellery is gradually making its way in Paris and has become fashionable. Two shops have already been opened for the exclusive sale of this well-known style of jewellery.

Mr. Hennequin, 74, rue Menilmontant, Paris, has patented and is now manufacturing a silver bracelet with a patent fastening. The latter is almost entirely hidden by the ornamentation of the bracelet.

The French Consul General at Quito (Ecuador) writes to the *Moniteur D. L. B.*, that there is a demand for the cheaper classes of jewellery in that country. The trade seems to be in the hands of Germans, who can sell cheaper than the French houses. He recommends Messrs. Albert Breille, and Gelvin et Granadas, at Quito; and Maulme et Fornot, at Guayaquil, as good houses dealing with jewellery.

Parisian gentlemen of taste wear now very little jewellery, but that little of good quality. For pins a good stone, sapphire, pearl or turquoise, surrounded by small brilliants are the favourites. Rubies and emeralds are considered too showy, particularly for day wear. Two rings are worn on the small finger of the left hand. They are made rather heavy in mat gold, one of them plain, the other with a coloured stone in the centre and a brilliant on each side. Watch chains are worn short and without appendages. With evening dress no chain is worn at all, although a good gold watch or chronometer in the waistcoat pocket is *bon ton.* Two studs only are worn in the shirt, also in coloured stones with small brilliants.

From the annual report of the Leipsic Chamber of Commerce we cull the following details referring to the watch and clock trade of that city. The watch business is unimportant. Orders come from abroad for cheap goods but at prices which render business impossible. High class work is well sought after for local requirements but the style does not suit foreign buyers. Clocks in unpolished oak cases and decorated with various antique coins in polished copper sell well, this article being a speciality of Leipsic. The prices are low and the work fair. The same report also states that Leipsic is gradually superseding Paris in the manufacture of gilt bronzes. A large number of clocks were sent from Leipsic during the year to England, Italy, Russia and Holland; Belgium is also commencing to draw supplies from there. The same mode of packing as in vogue in Paris obtains in Leipsic. We may add that probably the same designs are also used; that is, as long as Paris designs rule the market.

One of the worst features connected with the tax on silver plate is its injustice. Mr. E. J. Watherston rightly calls attention to the fact that the immense quantities of silver consumed by manufacturers of electro-plate remains untaxed, while the manufacturer of silver plate has to pay a duty of 1s. 6d. per oz. on every trifling and common use silver article. The Parisian manufacturers have no cause for complaint in that respect as the French government serves them all alike. Electro-plate is taxed as well as gold and silver plate, and by a law of the 13th of December last, they have imposed a tax of 100 frs. per 100 kilos. on nickel articles, domestic utensils as well as ornaments, and quite independent of the proportion of nickel contained in the alloy. By a still more recent order they have now placed articles of common metal simply nickeled in the same category and subject to the same rate of duty.

The French Academy.

MESSRS. JULIEN TRIPPLIN and EDWARD RIGG have been nominated "Officers d'Académie," in recognition of their services to technical education in translating M. C. Saunier's invaluable treatises on modern horology. This official recognition of the labours of our countrymen is a peculiarly graceful act on the part of the French Government. In point of fact, through them a great honour is conferred upon the trade, and we feel sure our readers will join us in warmly reciprocating this kind expression of good opinion.

Out and About.

By P. Howard.

THE business which had been successfully carried on for years at the corner of High Street and New Street, Birmingham, as watchmakers and jewellers, by Messrs. J. and L. Mole, is now in the proprietorship of Messrs. Skinner and Co.

High Time. That kept by turret clocks.

Our West of England readers should take a hint from this. "Tenders are requested for the repairs of the church clock of St. Stephen's, Launceston, Cornwall, and Mr. C. Graham White, of St. Stephen's House, Launceston, will be happy to supply particulars."

Things can't be much cheaper if they try. What do you think of this? "A splendid coral scarf pin, *mounted in gold*, sent post free to any part of the United Kingdom on receipt of 1s. 4d." I suppress the name, but the foregoing advertisement emanates from Prescot. *Verb. sap. sat.*

On a recent Saturday evening bogus notices, headed "The Clocks and Watches Act, 1885," and bearing the Royal Arms, were freely distributed in Warwick, warning the public that "all persons exhibiting any clock or timepiece in any public place, hotel, inn, &c., must, within fourteen days from the date hereof, have the dials and works altered to the new code, or they will be liable to be proceeded against." The publication of the document created some little consternation in the borough amongst those unwary ones who were at first thrown off their guard by its apparent genuineness.

A burglar alarm clock went off the other night without arousing any of the family. It went off with the burglar.

The *Liverpool Mercury* says:—We understand that within the last few days a lady resident in Liverpool, belonging to a well-known family, has been robbed of jewellery amounting in value to nearly £2,000. It appears that whilst recently travelling to London by the London and North-Western Railway, and from thence by the Great Western from Paddington, a bag containing the valuables she was carrying was taken from the railway carriage. The lady in question left the compartment at Paddington for a very short time, and on her return she found that the bag had been taken away. Information was immediately given to the railway officials and the metropolitan police, but up to the present time no trace of the valuable missing property has been discovered. Those best acquainted with Paddington Station are of opinion that this is one of a series of robberies perpetrated by a gang of swindlers, who, obtaining possession of valuable jewels, immediately send them to the continent, where they find a more ready sale than they would in England.

An inquest has just been held at Lancaster relative to the death of Edward Gardner, a watchmaker, aged 58 years. It was proved that on the previous Friday morning Mr. Bell, of the firm of Bell and Atkinson, watchmakers, went to Gardner's shop to see him about a watch robbery in which he was implicated with Thomas Turner Good, then under remand, on a charge of stealing forty-six watches. Mr. Bell there found two watches belonging to him. Gardner said he was just going to bring them back, and wanted Mr. Bell to take them, but he declined to do so, and ordered him to make a clear statement. The next morning Mr. Bell saw him again, and, eventually, Gardner told him where several of the watches were to be found, and he went round to the different shops and got them. In the meantime, Gardner had purchased a pennyworth of arsenic at a chemist's, and particularly asked whether it was sufficient to kill 100 rats. Upon receiving it from the assistant, he jocularly inquired, "Do you think it would kill you and me?" As he was well-known at the shop no suspicion was aroused. He became very unwell on the Friday night, but his son and daughter, who lived with him, thought it was only an ordinary case of sickness. A powder was obtained for him from a doctor on the Saturday forenoon, but death took place about half-past one o'clock in the afternoon. The chief-constable was not aware of the man's death until he went to the house to apprehend him.—The jury, after a lengthy consultation, returned a verdict of *felo de se.*

Some people grumble *now* at the striking of our public clocks, but I wonder what they will say when the local Big Bens boom forth forty, *i.e.*, chime 24 and the four quarters (another 16.) Of course this will be an ordinary state of things at midnight before I get bald and grey, at least, I prophesy so.

Speaking of twenty-four o'clock, I have just received a ticket of invitation to a ball, upon which is announced "Dancing at 21 o'clock," so you see that in jest, at all events, the new time system is being adopted. What begins in jest may end in earnest.

This "two dozen o'clock business" seems as though it is going to prove a good thing for this trade of ours. Take up the papers wherever you will all over the country, and you will find watchmakers making capital out of the alteration, and quite right too!

On the lines of "not too much 'two dozen o'clock' but just 'two dozen o'clock' enough" I'll shut up *pro tem.* on the topic.

Londonderry ought to be happy. It has a street called "Diamond Street," and on the corner of it is to be found the establishment of Mr. Andrew Ramsay, the watchmaker, jeweller, and diamond merchant.

Mr. E. C. Appleby, of 62, Kirkgate, Leeds, is an eccentric advertiser. He wants 100,000 watches to clean at 2s. each; the same quantity of clocks at 1s.; he warrants his work for twelve months after it leaves his hands.

"What did you kill?" inquired a man of a sportsman on horseback. "Time, you fool," was the curt reply.

Some people are not in the least particular how they become wealthy, *vide* the following:—Quite recently, at Nottingham, John Ireland, 39, porter, and James M'Loughlin, 32, labourer, were indicted for feloniously stealing three boxes, containing 157 gold watches and 475 silver watches, of the value together of £3,000, the property of Edoard Dimier at Nottingham, on the 1st December, 1884. The prosecutor is a jeweller in London, and on the day mentioned he was doing business in Nottingham. He employed the prisoner Ireland to wheel a handcart on which were placed three boxes of watches, and the prosecutor, accompanied by Ireland, went to various jewellers' shops. In the afternoon he went to the shop of Mr. Gill, watchmaker, Alfreton Road, Ireland staying outside in charge of the handcart. The prosecutor remained in Mr. Gill's shop, and afterwards went outside and took a case of samples from one of the boxes. He returned to the shop, and after being there for some time Ireland went in and asked him if he knew what had become of the handcart. The prosecutor, finding that it had been taken away, at once gave information to the police. The prisoner Ireland moved the handcart a few yards, and the other prisoner then took it away. After evidence had been given, the Recorder said he thought there was not sufficient evidence against Ireland, and the jury being of the same opinion, acquitted him. The learned Recorder summed up the case against M'Loughlin, and said if there was a reasonable doubt in the case the prisoner must have the benefit of it. The jury pronounced the prisoner to be guilty. The Recorder said prisoner was convicted of a robbery of enormous magnitude, and he would be sentenced to fifteen months' hard labour.

Another case was at Warrington, where a powerful-looking man, named Robert Haynes, was charged with stealing a silver watch, value £4, presented to James Rimmer, Gladstone-street, by the congregation of St. Alban's Catholic Church. The prosecutor's house was broken into on the afternoon of the 12th December, and a watch and a great number of articles of wearing apparel stolen. The prisoner was given in charge on the 8th inst. whilst offering the watch for sale to Mr. Richardson, jeweller, Rochdale Road, Manchester. He was committed to prison for three months.

A Horse-racing Jeweller.—Mr. Joseph C. Whittington, jeweller, 29, King-street, Manchester, residing at 205, Great Cheetham-street, Higher Broughton, examined by the Official Receiver, said his gross liabilities were £5,700, his net unsecured liabilities £3,760, and his assets £416. The debtor said he had lost £450 in Stock Exchange transactions. He was asked for the names of the brokers through whom he had done business. He refused to give the names on the plea that he did not want in any way to compromise the brokers. He had destroyed the brokers' notes. The Registrar told him he would have to give the names of the brokers. The debtor said then that he might as well admit that he had had no transactions at all on the Stock Exchange. He had lost the money in another way.

The Official Receiver: It will be better for you to tell us at once in what way it was.

The Debtor: Candidly, it was through horse-racing.

The Registrar: The nearest approach to the Stock Exchange,

The Official Receiver pointed out to the debtor that he had committed perjury, and that it would have been better if he had told the truth at first.

The debtor said the betting on horse-racing was confined to 1881 and 1882. He had borrowed money to pay his losses.

The examination was adjourned.

About the *want* of wealth on the part of Irish landowners, "Atlas" tells a good story. A baronet stated in the Westminster Police Court that he was not possessed of large means, his property lying in Ireland. The explanation was accepted as valid. This serves as a reminder for an incident which happened in a club recently. "What is the right time—I mean the exact Greenwich time?" asked one of the group. There was no response. "Bless me!" continued the searcher after truth, "d'you mean to say none of you chappies has a watch?" "Not a solitary ticker amongst us," answered the representative of a Hibernian Conservative borough; "we're all Irish landlords."

Lecture on Universal Time.

SOME lecturers on Horology, in order to make a show of learning, indulge very freely in abstruse terms. They talk of parallax and parallelograms, isosceles, equilateral, and scalene triangles, and use an abundance of algebraic formula, and, what is worse, there is a want of coherence and clearness in all their statements, so that after listening to their discourse, we arrive at the conclusion that all we have heard is about as clear as mud. A distinguished luminary in the Church was often heard to say, "it will take us all our time and learning to make things plain," and when we succeed in making clear that which is obscure, much has been accomplished. Mr. J. Norman Lockyer, F.R.S., possesses the rare gift of making a lecture to children on "Universal Time," instructive and entertaining.

But even Mr. Lockyer is not perfect. There is at least one slight inaccuracy in his lecture, and the Editor of the *Horological Journal* has seenfit to make a special note of it. We will not repeat his soliloquy. The circumstance reminds us of an old master who gave a valuable book to one of his pupils to read and make notes. Presently the youth returned the book with notes, pointing out all the errors it contained; the venerable master then asked the youth, "Is this all you have learned?" and he replied, "Yes." "Then," said the master, "here is a bushel of newly-threshed corn; take and separate me the wheat from the chaff." The obedient youth executed this order, and when he returned with the precious grain in one vessel and the chaff in another, the master said "Take the notes and the chaff, and leave me the valuable book and the wheat." The youth saw the mistake he had made.

"UNIVERSAL TIME: OUR FUTURE CLOCKS AND WATCHES.

By J. Norman Lockyer, F.R.S.

Delivered on Wednesday, January 7th, 1885.

"At the end of the last lecture, on New Year's-eve, I brought before you a proof that it is the rotation of the earth —which really spins like a top—which causes the apparent motion of the stars, and that it is not the stars themselves going round the earth which accounts for their apparent movements when we look at the heavens, either at sunset or sunrise, or any time of the night. You remember the proof was that we had a pendulnm which is heavy enough, and fond enough of doing its work in its own way, to remain in the swing-plane in which it was started. We had taken precautions, which I had not time then to bring to your notice, to let the pendulum hang and swing in such a way that it was perfectly free to go whichever way it wanted to go, supposing it wanted to go any way. In other words, therefore, it was perfectly uncontrolled by the movement of the earth, whereas below the pendulum we had a table which was by no means free to go where it liked. It was held firmly to the floor, and the floor is held firmly to the house, and the house is soundly built, so that perforce the table was obliged to move with the earth. The great point we got out was that the earth really rotates, and in a period of about twenty-four hours.

"Now, there are two or three things I want to say a word about before we pass from that point. Let us suppose that this globe which is going round represents the earth. We will throw the electric light on to it. We have our little figures again, which I will put on the magnets as before, and I want you to notice—assuming that the electric light represents the sun—that once in each rotation of this globe each little figure will catch the sun just over the edge of the earth between it and the lamp; it will then come round until at last it gets to the other side of the part turned to the sun—and then it will be carried on until, a little time afterwards, the figure will lose sight of the lamp, or little sun, altogether—the sun will appear to set—and find itself on the dark side of the earth, where, of course, it cannot get any light at all from the sun. Here, then, we have sunrise for one figure and sunset for the other. In that way we have, as the first result of this spinning of the earth, the phenomena of day and night.

"Now, there is another point I want to tell you about in connection with that. Of course we all know there is an enormous difference between day and night, but what is the origin of that difference? In the last lecture we had a little globe suspended in the middle of the hall, which we supposed to be surrounded by stars. Why, then, if the globe is surrounded by stars, is it that there is such a tremendous difference between day and night? The difference is just this, that the sun, which is a star, although it is not a very large one, is awfully close to us, practically speaking; it is only 92,000,000 of miles away, whereas all the other stars are at a very much greater distance, and, being this long distance away from us, they cannot give us so much light as the sun does. The sun being close to us, although it is a smaller star than many of them, gives us a good amount of light, just as a candle or lamp gives us a great deal of light if we put our book close to it; and it is because the sun is close to us, and gives so much light, that there is this tremendous difference between day and night. Some little children imagine that the stars are born every night, but that is not true. The stars are always there, although we cannot see them during the day, because the sun is so much more brilliant. I will make an experiment which will explain this to you. Here we have a board in which we have a constellation, which I dare say you have seen before, giving us the appearance of the seven stars. Those stars seem rather bright when the theatre is dark; but when I have the gas and electric light turned on, taking you, in fact, from midnight to mid-day, you will find that when the eye is flooded with the light which we get from the electric light and the gas, those stars will grow almost as dim as stars do in the day-time, in fact you will probably not see them at all (turning on the light). You cannot see them now, but on turning the light down you see they are still there.

"This is just what happens every daytime. Our artificial sun treats these artificial stars very much as the natural sun treats the natural stars. You all understand, then, that this rotating of the earth produces the appearance of sunrise and sunset; the putting out of the stars when the sun begins to fill our eyes with stronger light, and the coming out of the stars when the sun apparently sinks behind the globe. Really, it is the globe turning round from the sun which brings about the state of things in which our eyes are not filled with such bright light, and, therefore, the little stars begin to twinkle again.

"Now, I said the day was about twenty-four hours long, but, of course, astronomers must not be content to say a day is *about* twenty-four honrs loug; that will not do, especially as we have these very beautiful and accurate clocks nowadays; therefore I propose next to show you how the astronomer utilises this spinning of the earth for the purpose of getting the true time. For that purpose he gets a telescope, which is called a transit instrument, and he fixes it so that it swings along a circle which passes from the north pole to the south, in a plane which passes through the centre of the earth, and through the place of observation, so that he can, by moving the telescope, notice when each star is exactly on the line joining the points I have named. I have a slide here which will show you how he does that."

(*To be continued.*)

Bankruptcy Proceedings, &c.

Davis, Godfrey, 39, Colville Gardens, Bayswater, London, Diamond Merchant. January 13th. Examination at 34, Lincoln's Inn Fields, London, on February 18th, at 11.

Deane, William Henry, 43, Preston Street, Brighton, Jeweller and Silversmith. January 14th.

Dillon, James, 116, Ladywood Road, Birmingham, Jeweller. £39 18s. 3d. Eight creditors. January 8th. No. 300.

Fellows, Alexander, Alma Place, Prescott Street, Brookfields, Birmingham, Jeweler. £48 8s. 5d. Seven creditors. December 15th. No. 288.

Forster, Robert, Watchmaker and Jeweller, 106, King Street, Castle-Douglas. December 17th. A meeting to elect Trustee and Commissioners was held at the Town Hall, Castle Douglas, on December 29th, 1884. Claims by April 17th. Agents, Cumming and Duff, S.S.C., Edinburgh.

Fryer, Edward, 64, Walker Street, Hull, Watchmaker. £20 10s. 7d. Six creditors. December 15th. No. 460.

Fleming, James, 14, Cathcart Street, Greenock, Optician, &c. Trustee, James Nicoll, Accountant, Greenock, to whom claims forthwith.

Haisz, Matthias, 47, Lister Street, Birmingham, Clockmaker. £42 8s. 11d. Ten creditors. December 11th. No. 291.

Hedge, James, 4, Peas Hill, Cambridge, Watchmaker. £48 13s. 6d. Thirteen creditors. December 17th. No. 1.

Howard, John Bird, 96, Newgate Street, London, Watch Dealer. Trustee, Lawrence Hasluck, 23, Holborn Viaduct, London. December 17th, 1884.

Kennard, Dan Bentley, 25, High Street, Margate, Electro-plate Dealer. January 22nd. Examination at the Canterbury Court, on February 6th.

Kury, Joseph, 4, Hogarth Place, Earl's Court, Kensington, London, Jeweller. January 14th. Examination at 34, Lincoln's Inn Fields, London, on February 19th, at 11.

Lewis, Robert, trading as Lewis & Co., 10, Dyer's Buildings, Holborn, London, Electro-plate Dealer. Trustee, Lawrence Hasluck, 23, Holborn Viaduct, London. January 2nd.

Marx, Carl, trading as C. Marx & Co., 62, New Bond Street, and 92, Regent Street, London, Jeweller. Trustee, William Hurlbatt, Accountant, 8, Old Jewry, London. October 20.

Scott, Henry, Jeweller, 13, Clerk Street, Edinburgh. December 18th. Meeting to elect Trustee and Commissioners was held at Dowell's Rooms, 18, George Street, Edinburgh, on December 26th, 1884. Claims by April 18th, 1885. Agents, Cuthbert and Marchbank, S.S.C., 18, Frederick Street, Edinburgh.

Watson, Leonard, 243, High Street, Gateshead, and 55, Henry Street, Shieldfield, Newcastle-on-Tyne, Watchmaker and Jeweller. January 21st.

White, Beren, trading as Benjamin White, 76, Mulgrave Street, and 21, Parker Street, Liverpool, Watchmaker and Jeweller. Hearing at the Liverpool Court, on February 13th, at 11.

Whittington, Joseph C., 29, King Street, Manchester, and 205, Great Cheetham Street, Higher Broughton, Jeweller. Trustee, James Eckersley, 64, Cross Street, Manchester. January 21st.

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Dissolutions of Partnership.

Alstons & Hallam, 30 and 31, Bishopsgate Street Within, London, Gold and Silver Smiths. September 29th, as regards Thomas Rowland Alston. Debts by Henry Carter Alston and Harry Alston, who continue under the same firm.

Clarke, Charles and Alfred, trading as Thomas Hilton, 46, Vittoria Street, Birmingham, Opticians, &c. As regards Alfred Clarke.

Cotten, W. H. & Son, 75, French Street, and 1 and 2, Church Lane, Southampton, and Romsey, Silversmiths, &c. November 27th. As regards William Henry Cotten. Debts by William Vaughan Cotten, who continues on his own account.

George, W. & S., 50, King Street, Goswell Road, London, Goldsmiths and Jewellers. December 22nd, 1884. As regards Sampson George. Debts by Walter George, who continues.

Horne & Goldsmith, and R. Horne & Co., Leicester, Silversmiths, &c. December 20th. As regards George Goldsmith. Debts by Richard Horne, who continues under the firm of R. Horne & Co.

Hull, Bros., 43, Swan Street, Manchester, Jewellers, &c. December 31st, 1884. As regards William Henry Wright Hull. Debts by John Edmund Yates Hull, who continues on his own account.

Leighton, Thomas & Sons, 21, Snow Hill, Birmingham, and Spon Street, Coventry, Watch and Clock Material Manufacturers. December 12th.

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Bills of Sale.

Baker, Henry Edward, 3, Allendale Road, Selborne Road, Camberwell, Jeweller. December 20th. £30. Given to Consolidated Credit Corporation.

Graham, Alfred, 9, Junction Road, Eastbourne, Gilder, &c. January 21st. £40, &c. Given to Samuel Marsh.

Kirchel, Henry Emil, 5, Halliford Street, Essex Road, Islington, Watch and Clock Maker. January 17th. £30. Given to London Joint-Stock Loan Company.

Kury, Joseph, 4, Hogarth Road, Earl's Court, Kensington, Jeweller. December 24th. £368. Given to R. Feurderer, and another.

Müller, John, 98, George Street, Portman Square, Dealer in Jewellery. January 13th. £30 5s. (Absolute sale to wife.) Given to Lina Müller (his wife).

Page, George, 25, Alexander Road, Upper Holloway, Silversmith. January 10th. £30. Given to Benjamin Blaiberg. (Filed by order, on terms.)

Sainsbury, Henry, Black Horse Lane, Walthamstow, Clock Maker. January 19th. £30. Given to Thomas Attwood.

Sealey, Edward John, St. Mary's Street, Bungay, Watchmaker. January 20th. £40. Given to Walter Barker.

Smith, Charles W., 57, Lower Gardiner Street, and 26, Wellington Quay, Dublin, Electro Plater. November 20th. £50. Given to Alice Mary Smith, 50, Heytesbury Street, Dublin.

Smith, Edward, 36c, Eden Grove, Holloway, Jeweller. January 5th. £35. (Absolute sale.) Given to Charles R. Briggs.

Wells, James, 39, Norland Square, Notting Hill, Watch and Clock Maker. January 14th. £63. Given to James B. Evans.

Wilson, Arthur Ralph, 19, Bull Green, Halifax, Watchmaker. December 27th. £404 16s. 2d. Given to Lewes G. Russell and another.

Wright, Thomas (sometimes known as George Clare), 133, Fairbridge Road, Upper Holloway, Gold and Silver Mounter. January 17th. £30. Given to Charing Cross Bank.

BILLS OF SALE RE-REGISTERED.

Stoessiger, Alexander, 1, Lordship Terrace, Lordship Lane, East Dulwich (formerly 2, Royal Terrace, Westow Hill, Upper Norwood), Jeweller, to William H. Podmore (Trustee of Settlement) and others. Bill of Sale filed February 1st, 1870, for £240 5s.; re-registered January 12th, 1875, January 12th, 1880, and January 12th, 1885.

White, Richard T., Talbot Street, Dublin, Jeweller, to Edward V. White, Capel Street, Dublin, Pawnbroker. Bill of Sale filed January 20th, 1880, for £310; re-registered January 10th.

Applications for Patents.

16,401.—Charles Warren, 13, Fore Street, Ipswich, Suffolk, for "An improvement for registering the time of day and night applied to clock and watch dials."—Dated 13th December, 1884.

16,416.—Harry Wray Weller, 323, High Holborn, London, W.C., for "Improvements in or relating to faces of watches and clocks."—Dated 13th December, 1884.

16,520.—George Copplestone Rice, Devereux Buildings, Devereux Court, Temple, Middlesex, for "Improvements in timepieces."—Dated 16th December, 1884.

16,546.—William Robert Lake, 45, Southampton Buildings, London, for "An improved method of and mechanism for indicating time."—Communicated by Joseph Lindauer, United States.—(Complete Specification.)—Dated 16th December, 1884.

16,567.—George Hookham, 6, Livery Street, Birmingham, for "Improvements in brushes for dynamo-electric machines."—Dated 17th December, 1884.

16,570.—Eric Hugo Waldenstrom, 9, The Avenue, Lower Broughton Road, Manchester, for "Improvements in Clocks and Watches."—Dated 17th December, 1884.

16,632.—Jacot Burmann, 9 & 10, Southampton Buildings, Holborn, for "New and improved electric alarm watch or clock stand, and certain improvements in or connected with watches or clocks for actuating the said alarm or an ordinary electric bell."—Dated 18th December, 1884.

16,635.—William Rice, 169, Fleet Street, London, for "Improvements in clocks and other time-keepers."—Dated 18th December, 1884.

16,719.—William Charles Alldridge and David Blaikley, 6, Livery Street, Birmingham, for "Improvements in sleeve and cuff links, which improvements are applicable to other like dress fastenings and ornaments."—Dated 20th December, 1884.

16,724.—Richard Crowe, Junior, 25, Williamson Street, Liverpool, Lancashire, for "Improvements in the mechanism for the division of time, as applied to the motion wheels of clocks and centre-seconds watches."—Dated 20th December, 1884.

16,744.—Charles Hammond and Donald Alexander Joseph McFarlane, 4, Featherstone Buildings, London, W.C., for "An improved safety pocket receptacle for ladies' and gentlemen's watches."—Dated 20th December, 1884.

16,757.—William Henry Hugh Muir, 186, Fleet Street, London, E.C., for "Improvements in the dials or faces of watches, clocks, and other horological appliances."—Dated 20th December, 1884.

16,758.—William Henry Hugh Muir, 186, Fleet Street, London, E.C., for "An improved method of denoting time on the dials or the faces of watches, clocks, or other horological appliances, and apparatus therefor."—Dated 20th December, 1884.

16,854.—William Ernest Patterson and George Slater, 7, Staple Inn, Middlesex, for "An improvement or improvements in solitaires or fastenings for cuffs, collars, gloves, and other articles of dress."—Dated 23rd December, 1884.

16,855.—John Millward Banks, 7, Staple Inn, Middlesex, for "A new or improved method of plating silver with gold."—Dated 23rd December, 1884.

16,898.—Jacob Fellheimer, 9 & 10, Southampton Buildings, W.C., for "Improvements in lever watch mechanism."—(Complete specification.)—Dated 24th December, 1884.

16,928.—Alfred Henry Read, Corporation Street, Birmingham, for "Improvements in watches."—Dated 27th December, 1884.

16,931.—James Weir, 115, St. Vincent Street, Glasgow, for "An improvement in clocks and watches."—Dated 27th December, 1884.

16,946.—Edward Powell, 20, Eastgate Row, Chester, for "Adapting existing watches and clocks to the twenty-four o'clock system of time."—Dated 27th December, 1884.

16,975.—George William Baskett, Albert Lodge, North Street, Colchester, Essex, for "Adapting and utilising all existing faces or dials of clocks, watches, and mechanical timekeepers, and all such faces or dials to be hereafter manufactured, so as to indicate the hours and parts thereof from zero or midnight up to twenty-four hours prime meridian time."—Dated 29th December, 1884.

25.—David Osborne and John Darling, 115, St. Vincent Street, Glasgow, for "Improvements in indicating time on watches, clocks, and timepieces, and in the apparatus therefor."—Dated 1st January, 1885.

74.—William Henry Beck, 115, Cannon Street, London, for "A new or improved dynamo-electric machine."—Communicated by Henry Cadish, Paris.—Dated 2nd January, 1885.

129.—Christopher William Fincken, 28, Southampton Buildings, Chancery Lane, W.C., for "An improvement in the dials of timepieces."—Dated 3rd January, 1885.

149.—Charles Thurman Burrows, 8, Quality Court, W.C., for "Improvements in or relating to watches, clocks, or time indicators."—Dated 5th January, 1885.

178.—George Williams, Arcade Chambers, Corporation Street, Birmingham, for "Improvements in watches and other timekeepers."—Dated 6th January, 1885.

203.—James Kendal and Marc Laval, 1, Gresham Buildings, Basinghall Street, E.C., for "Improvements in dials and dial works of watches, clocks, and timepieces for indicating two systems of calculating time on one dial."—Dated 6th January, 1885.

248.—George Culver, 24, Southampton Buildings, Chancery Lane, London, W.C., for "Improvements in spectacles, eyeglasses, and what are known as folders."—Dated 7th January, 1885.

271.—Louis Howe Borrel, 166, Fleet Street, London, for "Improvements in watches or clocks for denoting the day of 24 hours."—Dated 8th January, 1885.

291.—Robert Henry Ellacott, Plymouth, Devon, for "Improvements in watches, clocks, and other timekeepers."—Dated 9th January, 1885.

293.—William Morris, 8, Quality Court, London, W.C., for "Improvements in the constructions of clocks and watches for geographical purposes."—Dated 9th January, 1885.

320.—Arthur William Lovell Reddie, 6, Bream's Buildings, Chancery Lane, Middlesex, for "Improvements in alarm clocks."—Communicated by The Ansonia Clock Company (incorporated), United States.—(Complete Specification.)—Dated 9th January, 1885.

385.—John Birkett, Market Place, Keswick, Cumberland, for "Improvements in dials for clocks, watches, or other time measurers having dials."—Dated 12th January, 1885.

407.—Charles Ankers, 21, Cockspur Street, Charing Cross, London, S.W., for "Improvements in the dials of watches, clocks, chronometers, and other timekeepers."—Dated 12th January, 1885.

418.—Arthur Junghans, 23, Southampton Buildings, London, for "An improvement in regulating the balance-spring of timepieces."—(Complete Specification.)—Dated 12th January, 1885.

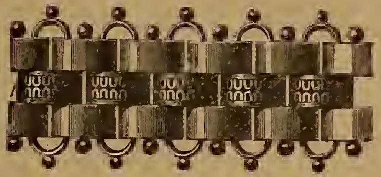
432.—John Eshelby, Tower Ville, Sandymount, Co. Dublin, for "Improvements in clock and watch dials and dial work."—Dated 13th January, 1885.

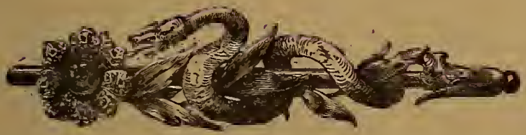
473.—Alfred Julius Boult, 323, High Holborn, Middlesex, for "Improvements in timekeepers."—Communicated by Joseph Fischer, Vienna.—Dated 13th January, 1885.

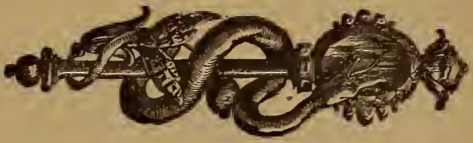
502.—George Alfred Fisher, 59, Broad Street, Birmingham, Warwickshire, for "Improvement in clock and watch dials."—Dated 14th January, 1885.

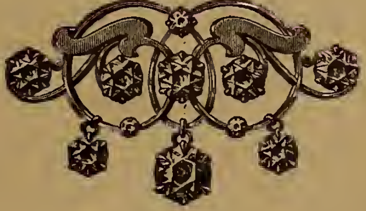
516.—Francis George Swinden, 6, Livery Street, Birmingham, for "Improvements in watches, clocks, and other timekeepers."—Dated 14th January, 1885.

MONTHLY SUPPLEMENT OF DESIGNS.









THE WATCHMAKER JEWELLER AND SILVERSMITH

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All need the beautiful—
Few can produce it.—Goethe.

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ILLUSTRATED SUPPLEMENT:—"Designs for Modern Jewellery."

Things New and Old.

ONE of the most important, and certainly one of the most difficult things in this life is to keep an evenly-balanced judgment with regard to new systems that constantly claim our attention. We are told, upon reliable authority, that the "Athenians spent their time in nothing else but either to tell or to hear some *new thing*," and they were very foolish people to waste their lives in this fashion, but it is quite possible for us to exceed their folly by indiscriminately rejecting every new system that is brought before our notice, without due consideration and the exercise of an impartial judgment.

The introduction of new systems is both a science and an art, and though neither can be said to be obscure, yet they are rarely understood; all think themselves competent in these matters, yet nearly all fail to handle them with any degree of propriety. It is not our province to reduce to order this intricate science, but we may safely point to some examples that are profitable to direct us in such matters. This morning (February 20th) at 7 h. 6 m. we had a new day given to us; it came *gradually*, *noiselessly*, and considering our climate and the time of year, the sunrise was one of unusual splendour. The old day was infirm by reason of its darkness, yet it was not suddenly supplanted by mid-day splendour. Its tokens for good were so apparent as to render a noisy proclamation unseemly; it was therefore appropriately accompanied by the grateful warbling of birds. Without pursuing the parallel further, the illustration will suggest a safe course of action. It is a remarkable coincidence that the first second of time in this year inaugurated a new system of measuring time, and that this year we are to hold an International Inventions Exhibition. In many respects it will doubtless be a year of innovations, and we are called upon to exercise our judgments as to what we shall accept and what we shall reject.

Messrs. Kendal & Dent, 106, Cheapside, have offered, through the Balloon Society of Great Britain, a prize of 100 guineas for the best essay on "Universal Time (new style) and our future Watches and Clocks." MSS., which may be in English, French, and German, should be sent to the

Secretary of the Balloon Society of Great Britain, 26, Budge Row, Cannon Street, London, E.C., on or before the 1st of July, 1885.

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Balloon Society Meeting.

February 13th, 1885.

G. N. Whipple, Esq., in the Chair.

THE chairman said the question of universal time is of considerable import to scientists and to geographers, but in this country, where it has been virtually settled by the adoption of Greenwich mean time by the railways, ordinary people only become aware of the existence of other times than Greenwich when they travel, and find, on arriving on distant shores, that their watches do not correspond with the clocks at the port where they land. Scientists experience the difficulty of different systems existing in other countries when they come to investigate phenomena, such as changes of terrestrial magnetism, which are frequently simultaneous over a great part of the globe. Accordingly, we find that the first step to the adoption of a universal time was the act of the German Magnetic Association, when in 1836 they decided that all the simultaneous observations made in different places on the Continent should be recorded according to Gottingen mean time. The same time is now being employed in certain magnetic observatories. As, however, Greenwich mean time has been adopted by the greater number of representatives at the Washington conference, I presume Gottingen mean time will soon become a thing of the past in magnetic science. As to the second part of the question, the hour of commencement of the Greenwich day, one could not help thinking that with the bulk of astronomers it would be extremely inadvisable to change from noon to midnight. As far as he knew, the existing arrangement was only confusing to novices, the general public cared nothing about it, and the change suggested by some persons would upset astronomical calculations for years, indeed, one might almost say for ages. The proposed modification of civil time, which of course possesses the greatest interest to us, has come into the discussion; we hardly know how, certainly it was not a point officially submitted to the Washington Congress. There does not appear to me any valid reason for the continued existence of the present system of twice reckoning; the half-day is not a limit of time; we compute by hours and days. Again, our nomenclature is incorrect and inconsistent, for 10 a.m. and 11 a.m. are not ten and eleven hours before noon, but two and one hours respectively, and in modern civilised life, noon is not the middle of the day with most people, but 15h. or 3 p.m. is the centre hour of the waking day. To count the day right on to 24 is the most sensible system, for in no transaction of ordinary life do we sub-divide units; and although in monetary transactions we count in fractional coins, yet in calculations such are ignored in most cases. A struggle will be required to introduce new reckoning, and Acts of Parliament must be passed. Watches and clocks can be easily altered, and in a few years I trust we shall class a.m. and p.m. with the old-fashioned quarter past, half-past, and quarter to, which now scarcely exist, other than as colloquial expressions.

UNIVERSAL TIME (NEW STYLE).

Read by C. E. Parker-Rhodes, Esq.

Irrespective of Geographical position, of nationality, of language, of characteristics; the events, circumstances, and incidents of everyday life are dependent on time. The creature's hopes, thoughts, expectations, actions, belong to the onward movement of the invisible power called time. In every language the value of time is expressed by mottoes, which although not capable of literal translation, convey a cognate meaning, principle and influence—"The Wheel of Time," Time flies," "Time revolves," "Time and Tide," "Leave to Time," "End of Time," "Time Heals," "Time Works;" and the third Chapter of the Book of Ecclesiastes supplies us with a completion of these paraphrases used in daily converse, in literature, in science, in philosophy, and may be applied in all the diversity of human labour as the guiding influence to good, or to evil. Time was when the form of our globe was unknown, when the Western peoples had not extended their researches westward and northward, when gas, steam, and electricity were unknown powers. Time has accustomed us within the nineteenth century to these invisible agencies, that by the application of man's mental ability to discoveries, we can, without the shadow of disrespect to the All-Omnipotent, assert that time has been overcome by those agencies—gas, when daylight has disappeared; steam, as the propelling power for locomotion; and electricity, as the instantaneous silent messenger of our thoughts and wishes round the globe, and into every corner of the earth. Through the several ages of the world, means of denoting time has been established by each community. Those of early date were the notched stick, the drop of water, the stroke on a sounding plate, the fall of a stake in the ground, from which it may be safely assumed that the sun-dial was contrived by the ancients, as this latter method is found in use in the most eastern parts of the globe, the natives, unacquainted with western education, being able to ascertain the hour of the day by the shadow thus caused. The "Clepsydra," or "Water" time indicator, has been traced to the early Egyptians, and is supposed to have been their most improved method of denoting time. In the middle ages the monks are credited with the invention of clocks and watches, and the mechanism of modern clocks and watches may be said to have reached perfection in our time. Each country has its speciality of clock and watch mechanism, and all aim at that precision by which the most correct time can be kept. Punctuality is the politeness of royalty towards their subjects, and this axiom is likewise applicable in every class of society, wealth and rank making no exception therein. Thus it is that correct indication of time of day and night are of the utmost importance in private use and for public utility. Our ancestors were accustomed to the church clock as the only one, public, whereas we look to the Railway Companies for the correct time of day, and to them the most remote localities are indebted for true time. But here may be raised the question whether the hour and minutes indicated are the exact time of day or night, when we consider that in the United Kingdom of Great Britain and Ireland, two hundred and thirty-eight localities, and sixty-eight foreign places, as given on Messrs. Kendall & Dent's Time chart, have a difference, slow or fast, with Greenwich Observatory. Those east of Greenwich being fast and those west of Greenwich being slow, from a few seconds to the extent of many hours in variations. Passing to the continent of Europe, the time is computed by the Paris Observatory for all France, that of Berlin for all Germany, that of Berne for Switzerland; Rome, Prague and other chief cities regulate the time throughout the respective countries, each separate standard of time differing from the mean time of Greenwich, slow; or fast. Crossing to the American continent, from the furthermost point of Canadian territory north, to the extreme point of the United States of America South, and to the Pacific Ocean from the Atlantic Ocean, five standards of time govern all railways under the designations Intercolonial 60 meridian, Eastern 75 meridian, Central 90 meridian, Mountain 105 meridian, and

Pacific 120 meridian, each establishing actual time. Besides the use of these five standards in the principal cities for special purposes, those cities, numbering seventy-six, are, however, regulated by their own local time.

The Intercolonial time is not now in use, the railways in that area being worked by Eastern time. The Eastern Telegraph Company use Greenwich time on the whole of their lines, which, with connections, bring into almost instantaneous communication with the City of London the most distant parts of the globe, East and West, North and South. Reference to the time-tables of our railways will make it evident that time expressed in the division of twelve hours day and twelve hours night, under the initial letters A.M. and P.M., or the words day and night in foreign time-tables, would be more easily read if given from one to twenty-four hours. And this becomes more apparent on looking through continental time-tables, with their numerous head, foot, and side notes, that at the same station French time regulates one side, and German time governs the other side, and during the journey these two standards give place to Swiss time; and like changes take place in passing from and into other countries. The day being formed of twenty-four hours, it would be more in harmony with that numerical length of day to read the time accordingly, in place of the two divisions of twelve hours.

The dial of twenty-four hours at the Greenwich Observatory, at Rome, and several other places, has been in use for many years; the one at Greenwich marked 0h. 0m. 0s. at noon to December 31st, 1884, and from the first day of January, 1885, 0h. 0m. 0s. was made to terminate at midnight.

It was evidently an oversight to have made the division of each twenty-four hours at noon, as by so doing two days would be partially used without any break in our labour, and our rest would equally absorb parts of two days in the designation of hours. Messrs. Wales and McCulloch of Ludgate Hill, possess a "Regulator" by Molyneux, formerly the property of Mr. Jesse, the naturalist, supposed to be fifty years old, with the second, minute and hour circles, the latter numbered to twenty-four. This reading of one to twenty-four hours from midnight to midnight is in accordance with Scripture, "the evening and the morning" forming the days enumerated by the work accomplished; and by the universal law of nature can be made applicable to every latitude and longitude by an international convention under the "International Prime Meridian and Time Standard Congress," whose last meeting was held at Washington, October 1st, 1884. The South Indian Railway is now worked on the twenty-four hours, from midnight to midnight.

I have now reached the question of universal time as one having priority over others of equal international importance, owing to the many hundred variations of time herein alluded to. While countries were kept distinct by autocratic rule, by despotism, by prohibitive tariffs, by difficulties of travelling, etc., it was of little consequence and of no inconvenience for each people to have their own particular time by which their social and commercial life was regulated. But when considering the removal of these obstacles, and that international intercourse has within the last three decades made all people acquainted with Western civilisation and progress in the arts, sciences, and industries, the results being that each individual may justly style himself a citizen of the world, realising the idea of Humboldt, "Universal citizenship" in his "Cosmos" is from apathy, indifference, or national sensitiveness called jealousy, containing no admixture of honour and dignity as a palliation therefor, European nations are still with distinct systems of noting time of day and night.

From the first ray of the sun until the meridian, or from noon until midnight, an error is perpetuated by designating each division day and night, and reading from one to twelve on any part of the globe.

By treaties of commerce, conventions of navigation, Postal Union, and agreements of extradition, all and each affecting the welfare, the well-being, and the safety of the individual mutually, legislation is put into action for fair and equitable treatment in matters of a purely human arrangement, then why continue the disturbance of the Creator's organisation, over which man possesses no power or control.

However language, manners, and customs, with their corelatives, distinguish one people from another; the same sun gives light to all, and the darkness that follows is produced by the same cause throughout, the duration of both light and darkness, differing only by reason of latitude and longitude, or geographical position.

It is likewise erroneous to say that the sun rises and sets. when we all know that day and night are caused by the earth's rotary movement daily and annually. Although the day is for labour, and the night for rest, as prescribed by the Creator in the first Book of Moses, Chapter i., and renewed by the Saviour's admonition, "The night cometh when no man can work," we convert day into night, and night into day, by the perversion of Nature's fundamental laws. The telegraph, the telephone, and even steam make it important to place the whole world under an universal system of time. As already mentioned, the Eastern Telegraph Company, whose wires envelope the globe, have adopted Greenwich time in the transmission of all messages. Why, then, should there not be one meridian for all nations? To accomplish this undertaking, a line from a centre point between south and north in the east, to meet a similar point to the west, to encircle the earth, would establish a true prime meridian for all scientific routine and international work, under an universal designation of the day of twenty-four hours. This much-needed change would not interrupt the movement of the earth, or alter the course of the planets, or interfere with the light from the sun in any latitude, or longitude. From this newly-established point whence the meridian would be obtained, some difference would naturally arise as with the present astronomical observations, but in this little difficulty would be experienced in the future arrangement of all astronomical computations and calculations. At many periods of the world's history Eastern nations have reformed their calendars under the influence of religion, the distinctions still being retained, as may be instanced in the religion, history, and society of the Jews wherever located, and of the Mahomedans.

As France founded the Republican calendar in 1792, by decree of the Convention 1793, and on the 1st January, 1806, Napoleon, by decree of 1805 returned to the Gregorian style, so could all nations, with one accord, adopt without further delay the universal time of day. Electricity would be the agency to denote the instant to regulate the observatory clocks of the different nations, and by them the railway clocks could be set. The proposed prime meridian will ere long be adopted by all nations; the metric-decimal system has already become the national system of twenty-two States, and France, the founder of that admirable combination by which weights, measures and currency are, in their operations, reduced to the most simple calculation, carries it into those parts of the globe where French rule is established. Great Britain, as the first commercial nation in the vanguard of civilisation, will gain much by aiding in the universal adoption of one system of denoting the time of day to begin at 0h. 0m. 0s. midnight.

In conclusion, I may assert that railway and public clocks can be easily altered from twelve to twenty-four hour dials, and at the same time the new dials could be more distinct at the required distances for public reading by day and by night. What has been done for private convenience can be easily effected by the Government under legislation, and by realising this great and yet simple change, the necessity for setting one's watch with Dublin time, or with Edinburgh time, on arriving from London, to be reset on returning to London, would disappear, and likewise in crossing the Channel to the Continent.

The incorrectness of clocks and watches may in the majority of cases be safely attributable to the difference in local time and not to defect of the particular clock, or watch. Considerable anger and disappointment are caused daily by difference of time. When difference is observed no rule exists by which one time in preference to the other shall be accepted as the correct time.

I have to express my obligations to the Astronomer Royal, Sir James Anderson, Messrs. Cook & Son, and other gentlemen for the valuable information embodied in this paper.

May the scales of prejudice (being solely the darkness of ignorance) fall from our eyes, and the one light of Heaven guide our efforts towards universal brotherhood for the accomplishment of universal good.

The following resolution was then moved by Mr. E. H. Lefevre, President of the Society, and seconded by Mr. Tate :—"That this meeting is of opinion that the new style of reading the time should be adopted for scientific purposes and by railway and telegraph companies, and the Postal Telegraph Department."

Mr. F. J. Wilson, comprehonsionist, on rising, said in effect, Mr. Chairman, I beg to propose the following amendment. "That this meeting in acknowledging the rights of the astronomers and telegraphists to do as they please as to substituting the twenty-four hour system, deprecate its introduction for the social calculations of life." Sir, it is odd for me to find myself in opposition to improvement. Nothing is made by man which cannot be improved upon; but in this instance I adhere to the good old division of the day into twelve hours. Think of the astonishment to a wife on her husband informing her that he would be at home at 23 o'clock, or that he would be in for lunch at 14 o'clock. Of course, astronomers can do as they please with the nautical almanack, as we give them permission to be as *nauti* as they like with it. We do not care even if they dissect the time-honoured zodiac in separating the twins and the fishes, taking the scales from the virgin and the watering pots from the waterman. But when it comes to altering our clocks to strike twenty-four instead of twelve, I should not like to sleep in the vicinity to Big Ben. One could not, as with the man who bought a "Sam Slick," say to the maid, "Mary." "Yes, Sir." "Just you stop that beastly Yankee clock until I can get accustomed to it." Sir, I consider this twenty-four hours system would be a dreadful innovation. I presume the School Board would be yearning to double the multiplication table and ask what is 18 times 19? In fact, Sir, it would cause such a heart-rending bewilderment in our domestic relations, that though I doubt the probability of putting the people up to the time of day, I propose the amendment in the hope that such an infliction will not be attempted.

Mr. F. Hope Merischord said :—Mr. Chairman, Mr. President, ladies and gentlemen. I came here prepared to support the resolution, if its utility were successfully established by the argument of its proposer and his followers, but, having heard these gentlemen, I fail to find they have given any sufficiently good reasons for change in existing method. I therefore now beg to second the *amendment* before you, and I ask you, ladies and gentlemen, to express by your vote the practical inutility of the suggested change, as stated by the several speakers in this room to-night.

The resolution was then put and carried by a large majority.

The Gold and Silver Duties and the Hall-Marking Question.

By G. E. Gee.

WITH the view to the further elucidation of this important question, before the Legislature of the United Kingdom takes the matter practically in hand, with the object of lessening or removing the hardships which are now harassing the members of the various branches of the gold and silver trades, and a desire for the encouragement of every particular department engaged in the manufacture of gold and silver wares, a few observations or suggestions, together with all necessary details in harmony with the subject, may not be considered out of place, but rather of some service, at the present juncture of affairs.

The evils under which the trade and those connected with it are suffering have so recently been pointed out by myself and others that any additional remarks in that direction would be superfluous. I shall, therefore, direct attention to the following suggestions for the improvement of the exigencies of the trades before mentioned, and venture to trust they may be embodied in any new Bill—even if in a modified form—with which Parliament may be called upon to deal in the ensuing Session.

As a practical man, the following are the suggestions I would advise should be adopted in the new Hall-marking Bill shortly to be brought into Parliament :—

1. The abolition of all the existing duties on gold and silver wares.
2. The abolition of the yearly trading license now required to be taken out by goldsmiths, silversmiths, and dealers in those wares.
3. The abolition of Goldsmiths' Hall and all the subordinate Halls in the United Kingdom, the present Halls to be re-created where necessary, and their number increased or diminished in accordance with the exigencies of trade. The whole to be placed under Government authority, of which the Mint should be the head.
4. The abolition of compulsory Hall-marking in the United Kingdom, and the establishment of a purely voluntary system for all standards alike.
5. The abolition of the existing Hall-marks at all the assay offices, and new marks substituted, those marks not to exceed three in number at most, and used for the purposes described in the following sub-sections :—
    - (*a*.) The establishment of a *distinctively representative Government*, or *Mint mark*, to be used at all the assay offices. Such a mark, typical of the English nation, might be selected from the following—viz., *a royal coat of arms*, *a crown*, *a lion*, or the *Queen's head*, as now used at the Mint for the currency. One of these might be selected for gold and another one for silver, either of which would make a good British Hall-mark, highly suggestive of the British empire.
    - (*b*.) The quality mark, expressed in numerals, representing either the carat or decimal system.
    - (*c*.) The maker's mark, which should be the initials of his Christian and surname, as now used.
6. The repeal of all the existing statutes relating to the assaying and marking of gold and silver wares, and the consolidation of the law upon the subject into one short Act.

7. The establishment of any standard for gold and silver wares; the same to be Hall-marked or not, at the option of purchasers.
8. No work to be broken up.
9. Uniformity of practice and charges at all the assay offices hereafter appointed to do the work of assaying and marking.
10. The registration of the maker's mark, and also the Mint or Government mark under the Trades Marks' Acts.
11. The adoption of the "Touch system" of assay as well as the Scrape and Parting assay as now employed; the former for the purpose of testing light, fragile work, and also for finished work when required.
12. Foreign work assayed and marked in the United Kingdom to be marked with a separate punch, so as to distinguish all foreign work from that of home manufacture. Such punch may represent a *bird*, or other similar conspicuous mark.
13. The proportions respectively of gold and silver kept from manufacturers' parcels of work for the purpose of assay and for the dict box should be much reduced, and established upon the same basis as is adopted by assayers and refiners in their dealings with all the trades employing the precious metals.
14. The establishment of penalties for fraud, forgery, and all other malpractices, which should be severe.
15. All the branch assay offices should be self-supporting, and the charges for assaying and marking adequate for such purposes.

I would strongly urge the advisability of adopting the voluntary system of Hall-marking, because then a customer could procure an article either Government-marked or not, in accordance with any expressed desire, and the maker would be free to supply such articles; and it is a well-known fact that orders are sometimes placed for such goods on account of the disfigurement which is often occasioned through the process of marking; and, further, if the "Touch" was adopted in any new statute, the quality of such articles could easily be ascertained, and the vendor punished if the quality was not what it was represented to be. I would also testify to the importance that ought to be attached to the number of marks as here suggested; they would be much better understood by every one, and it would not require an expert to decipher them, as it does now. By the adoption of various standards the new marks would not at all be likely to become complicated, the general public would readily become conversant with them, and they would admirably represent the English nation abroad.

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Moritz Grossmann.

WE regret that the promised memoir of Mr. Grossmann has to be held over for our next issue, owing to delay in the delivery of the woodcut of his portrait.

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Reviews.

WE have received from Messrs. Wiley and Sons, of New York, a copy of a new work just published by them, on the "Art of Letter Engraving" by Whelpley. It contains nearly two hundred pages of really practical information, besides giving numerous illustrations, and would, no doubt, be found a very useful and reliable book, especially to beginners. The author has undoubtedly given much time and attention to the requirements of beginners, while the whole work is a practical embodiment of the art in all its essential details.

Jewellery:

ITS HISTORY AND MANUFACTURE PRACTICALLY TREATED AND ILLUSTRATED.*

(*Continued from page* 103.)

IN our last paper we gave a description of some of the articles from the Ashanti indemnity as characteristic of the amount of design and workmanship prevalent amongst a savage race. It will be necessary for our purpose to trace onward the progress of various nations in the development of religion, with its symbols and ceremonies, of written characters and their adaptation to various languages, and all those arts and processes which, taken together, make what we call civilisation.†

In tracing the histories of nations, as relative to our subject, from the earliest ages to the present time, there will be, necessarily, some repetition if we are to put before our readers a clear conception of the various styles of each, because the history of no nation is perfectly independent of that of others; but we will endeavour to avoid such repetition as much as possible, consistent with the plan which, to our mind, will give the clearest view of the subject; we shall therefore take each nation separately, from the earliest date possible to the decay or fall of the same, tracing as briefly as possible its history, and giving specimens of its work.

It would be a task both exceeding the plan of these articles and extending far beyond the space at our disposal, to attempt to give a detailed history of those great empires which succeeded one another in Mesopotamia down to the period of the Persian conquest. Until quite lately their history was, for the most part, fabulous, and it was difficult to say which of the events or persons mentioned were real, as the Greeks in their histories combined the most striking qualities of several persons and epochs, and made one legendary hero of the combination. The recent discoveries at Nineveh and other places have altered this to some extent, but much still remains to be learnt.‡

The first country mentioned is that called by the Greeks Susiana, and by the Hebrews Elam. In the Bible (Genesis xiv.) we find that Chedorloamer, King of Elam, was master of the whole basin of the Tigris and Euphrates in the time of Abraham, and among his vassals were Amraphel, King of Shinar, and Arioch, King of Eleasaar, the two principal cities of Assyria. The last of the Ninevite conquerors, Assurbanipal, took Susa 1,635 years after Chedornakhounta, King of Elam, had conquered Babylon. Assurbanipal took Susa in 660. The Assyrians had a taste for chronology and astronomy, and, therefore, their calculations are likely to be correct; we may, therefore accept with confidence the figure named by Assurbanipal, and his chronicle may be taken to give the oldest date in the history of Chaldea, B.C. 2295, as the year of the Susian conquest.

The Elamite Dynasty was succeeded by a native Chaldean dynasty, which appeared in 2047, and lasted 458 years, bringing the time down to the Egyptian conquest of Mesopotamia by the Pharaohs of the Eighteenth Dynasty. After this conquest Mesopotamia was eventually divided into Babylon and Assyria, of the latter of which Nineveh was the capital. These countries were continually engaged in war, and were also overrun by the barbarians called by the Greeks the Cimmerian Scythians. The work begun by the Scythians was finished by the Medes and, as far as we can tell, Nineveh fell before a coalition of Media and Chaldea. This would be about 625 B.C. After the obliteration of Nineveh, the Medes and Chaldeans divided Western Asia between them. The Medes kept Assyria, and extended themselves to the north over the whole country between the Caspian and the Black Sea. To the south of these regions the second Chaldean Empire took shape (625—536 B.C.). It made no effort to expand eastwards over that plateau of Iran where the Aryan element, as represented by the Medes, and soon afterwards by the Persians, had acquired an ever-increasing preponderance; but it pretended to the sovereignty of Egypt and Syria. In the former country, however, the Saite princes had rekindled the national spirit, and the frontiers were held successfully against the invaders. It was otherwise with the Jewish people. Sargon had taken Samaria, and put an end to the Israelitish kingdom; that of Judah was destroyed by Nebuchadnezzar. Thanks to its insular position, Tyre escaped the lot of Jerusalem, but the rest of Phœnicia and all northern Syria were subdued by Babylon.

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† "A History of Art in Chaldea and Assyria." Perrot Georges and Chipey Charles. Translated by Walter Armstrong, B.A. (Chapman and Hall. 1884.)

‡ "The Five Great Monarchies of the Ancient Eastern World." By G. Rawlinson. Fourth edition. 3 vols. 8vo. (Murray. 1879.)

Nebuchadnezzar reigned (604—561) forty-three years, and left Babylon the largest and finest city of Asia. After his death the decay was rapid; the kingdom was overrun by the Persians, led by Cyrus, who took Babylon in 536. Babylon was eventually ruined by the foundation of the city of Seleucia. Under the Parthians, Ctesiphon succeeded to Seleucia, to be replaced in its turn by the Arab metropolis of the Caliphs, Bagdad.

Although not coming in the strict order of chronology, we give here an account of some remarkable relics found in the excavations at Thebes.*

These articles were sent to England in 1862 for exhibition in the Egyptian Court of the International Exhibition at South Kensington, by the liberality of his Highness Said Pacha, the late Viceroy of Egypt.

The circumstances of the discovery are as follows:—

In 1859 M. Mariette had remarked at the entrance of the valley of the Bibau-el-Melook, or Valley of the Tombs of the Kings, in the Gournah quarter of Thebes, a strip of earth, formed of fragments of stone and broken pottery, revealing the situation of an ancient sepulchre.

On 5th February, 1859, a magnificent gilded wooden coffin was found there, in a pit of between fifteen and eighteen feet deep. This coffin resembled those of the monarchs Euentef, or Hanuentef, of the Eleventh Dynasty, made in the form of mummies, distinguished by their being hollowed out of a single piece, which have the outside of the lower part of the case coloured blue, and the upper part white, decorated with the representation of plumes, or gilded: while on the flat part under the foot, Isis and Nephthy are represented kneeling and and adoring the monarch. The coffin was buried in the ground itself, and not deposited in any sepulchral chamber. The coffin contained the mummy of the Queen Aah-Hotep, the wife of the monarch Kames, of the Seventeenth Dynasty, and the mother of Aahmes I., first monarch of the Eighteenth Dynasty, who commenced the expulsion of the Shepherds from Egypt.

(*To be continued.*)

Foreign Items.

By A. Fischer.

The watchmakers' school founded in Paris four years ago, under the auspices of the Watchmakers' Association, seems to be a success. The establishment is situated at 99, Faubourg du Temple, and has 60 pupils, a third of which are indoor. Pupils are admitted from the age of thirteen. The French Government takes a warm interest in the school, and Monsieur Rouvier, Minister of Commerce, accompanied by Deputies and the directors of various trade and educational institutes, has just paid a visit to the school, and the president of the association, Monsieur Rodanet, had the honour of introducing these distinguished visitors. The results of the inspection are stated to have been most satisfactory, and the Minister warmly congratulated the president and teachers of the school. A very handsome regulator, entirely made by the pupils, was presented to Monsieur Rouvier, in commemoration of his visit. We may add, that the pupils are only allowed the use of machine tools during the last stage of their apprenticeship, that is, after they have well mastered every kind of hand labour.

Mr. Gaston Pilet, of Besançon, has patented in France and various other countries a new system of electro-deposition of precious metals on any metal, without a previous coating, while at the same time securing perfect adherence. The Paris agent for the process is Mr. J. Mainot, 96, Boulevard Magenta, where specimens and all further particulars can be obtained.

Mr. P. Gabriel gives the following new method of tempering steel, in the *Revue Chronometrique.* Cyanide of potassium is dissolved and red-heated in a metallic or earthen crucible; the pieces of steel are then immersed in the liquid until red and afterwards plunged in water. This process is said to give great satisfaction and many advantages are claimed for it. The temper is said to be harder, and if a finished piece is under treatment the polish is not lost. It will show a greyish tint, but the original polish will reappear immediately, if a piece of polishing wood with the finest rouge is passed over it. It is also said that if the steel has been well annealed and not put out of shape by the file or the hammer, it will come from the crucible perfectly straight; arbors 4 or 5 centimetres long are not deformed, if tempered by this method. It is recommended as particularly advantageous for tempering escapement springs.

The appearance of platinum may be given to copper by immersion in a bath composed of 1¾ pints hydro-chloric acid, 7½ oz. arsenic acid and 1¼ oz. acetate of copper. The article must be cleaned before immersion, and left in the bath till it has the colour of platinum.

Mr. Gabriel Levy, the well-known jeweller in the Avenue de l'Opera, Paris, has lately had some very unwelcome customers. His shop was broken into, the safe opened, and stones and jewellery abstracted to the extent of £30,000. The thieves showed a good deal of discrimination, as they left all articles bearing names or inscriptions behind them, thus all the watches remained untouched. Among the plunder they had several sets which had been on exhibition in the window, and were valued at many thousands of pounds.

The diamond market in Paris is still very quiet. Large stones, fine and white, and well cut, are much sought after, and prices rule excessively high.

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* "Fac-similes of the Egyptian Relics Discovered at Thebes, in the Tomb of Queen Aah-Hotep (Circa B.C. 1800)." From drawings by E. Kiddell, with descriptive letter-press by S. Birch, LL.D., F.S.A., etc. (W. Dufour, 17A, Great George Street, W. 1863.)

Several new firms dealing in and exporting jewellery, watches, and kindred articles have been formed in Paris during the past month:—Société Breuillard & Co., at 60, Chaussée d'Antin, with £52,000 capital; Société Berrogain & Co., 125 Faubourg Poissonière, with £4,000 capital; J. & B. Bapts & fils, at 25 Faubourg Saint Honoré, with £28,000; and Feil Père & Mantois, at 30 Rue Lebrun, for the manufacture of optical glasses and imitation stones, capital £4,800.

Besançon, like many other towns, even among the watch-manufacturing ones, has for a long time past suffered from the irregularities of its clocks. The complaints of the public have at last reached the Mairie, and steps are now being taken to secure something like correct time. The regulator at the Mairie, which gives the standard time for the public clocks, will be connected with the Observatory. Pending this arrangement, the administration will obtain the correct time at the Observatory three times a week by means of a watch of precision. The administration is kind enough to inform the public through the newspapers what days and hours the correction of the regulator takes place.

To the *Moniteur D.L.B.* we are indebted for the following particulars refering to the French exports of watches and jewellery to the various South American States:

Argentine Republic.		
Gold plate	frcs.	2,437,300
Watches etc.	,,	42,600
Imitation jewellery	,,	1,391,600
Mexico.		
Fine jewellery	,,	304,458
Common jewellery	,,	447,400
New Granada.		
Fine jewellery	,,	448,067
Common jewellery	,,	138,600
Watches etc.	,,	82,050
Venezuela.		
Jewellery	,,	152,934
Brazil.		
Fine jewellery	,,	1,187,632
Common jewellery	,,	856,800
Watches etc.	,,	128,968
Plated ware	,,	68,684
Optical and scientific instruments	,,	488,302
Uruguay.		
Fine jewellery	,,	5,252
Common jewellery, 637 pieces	,,	127,400
Peru.		
Rolled gold	,,	217,600
Fine jewellery	,,	227,581
Saint Thomas.		
Gold jewellery	,,	66,391
Cuba and Porto Rico.		
Fine jewellery	,,	623,975

Reports from Chili say that bracelets, necklaces, and earrings enjoy the largest sale in that market. The quality required is low, and the favourite colours blue, red and green.

The International Exhibition of silver ware, jewellery, bronzes, etc., to be opened at Nuremberg on the first of May next, promises to be a more than usually important affair. Nuremberg has an old reputation for art industry, and if there were no other names connected with that city than Dürer and Jamnitzer it would already have sufficient claim to selected as the seat for an exhibition of art works in precious metals. A lottery will be held in connection with the exhibition, the prizes to be selected solely among the exhibits. We heard that entries are very numerous, and that such a collection will be got together as will prove of the highest interest to every manufacturer. The exhibition will be closed on the 31st of October.

From a report of the French Embassy at Rome, we cull the following details about the jewellery trade in that city. Our authority says: Parisian jewellery is always in special demand here on account of its tasteful designs. New models, especially of some special *genre*, always find immediate customers. It must however be remarked that Rome has now many good working jewellers and even artists who are quite able to produce perfect imitations, and sometimes even improvements on the originals. An ever-growing competition to foreign manufacturers therefore exists. Fancy articles not exceeding £12 in price find ready customers in Rome, but very high-priced *parures* are sold only occasionally. Another serious competitor is "Roman Jewellery," a local speciality much sought after by foreigners. The number of dealers in this style of jewellery is very considerable, but in spite of severe competition they all seem to be able to realise good profits. To manufacturers who have at present no correspondents in Rome, the following list of the principal jewellers and watchmakers of that city, will be useful.

Tommaso Garibaldi, place Rondanini, 33.
Pierre Venturini, rue du Corso, 130.
Scipione Poce, id. 506.
Gaetano Scrighi, id. 403.
Francesco Lelli, rue Monte d'Oro, 91.
Angelo delle Belle, rue Fontanella di Borghese 21-22.
Agostino Boni, rue des Cappellari, 45.
Fiorentini Agapito, place d'Espagne, 91.
Luigi Lamponi, rue della Croce, 39.
P. Haepli et Cie., place St.-Apollionaire, 37.
Kobell, rue del Gambero, 19.
Innocenzo Ricci, rue du Corso, 210.
Fénoglio, rue Pic di Marino, 2.
Marchesini, rue duc Maccelli, 108.
Kolbauer, rue du Corso, 138.
Tafani, rue du Corso, 156.
Pierret, place d'Espagne.

Retailers in Paris and also in the provinces of France report better sales—a fact attributed to the fine weather.

During the past year France has imported gold and platinum, laminated, or drawn for frcs. 4,197,978 against frcs. 3,520,752 in 1883; and rough platinum, ingots etc. for frcs. 517,181 in 1883 against frcs. 282,420 in 1884.

The fashion of making up insects into jewellery is now being followed up in Paris by adopting little bulldogs as models. They are manufatured in various metals, and principally applied to brooches, bracelets, hair pins, etc.

At the last opera ball in Paris red cravats were worn in lieu of the traditional white ones. If this fashion becomes general, as most likely it will, manufacturers of pins and dealers in precious stones will have a good time of it.

Trade in Roumania seems to be in a very unsatisfactory state, and under present circumstances offers little inducement to exporters. Besides the general stagnation of business, the great variations in the rate of exchange are a serious drawback. For instance, in November last in the course of only four days the rate varied as much as 7 per cent. On the 20th of last March the gold discount was 2¾ per cent.; on the 14th of November of the same year, 8 per cent., and on the 18th of the same month, 15 per cent. That such a state of affairs should have brought on a severe and lasting crisis is not to be wondered at. Roumanian exports in 1883 reached £8,840,000 while the imports amounted to no less then £14,400,000. It must be understood that Roumania is an agricultural country, with hardly any industry; it is therefore no wonder that an excess in imports of £5,560,000 should bring in its train a gold rate ruinous to business. This condition of Roumania imposes on exporters the necessity of great caution; and no credit deliveries should be made unless the degree of solvability of the customer is clearly ascertained. The business morality of many of the commission houses is also extremely lax.

During January of this year the Bureau of Control of Besançon stamped 10,461 gold, and 24,010 silver watches. These figures if compared with the same month of last year show a decrease of 8 gold, and an increase of 347 silver watches.

The Society of Watch Manufacturers and chefs of the various ateliers in Bienne and neighbourhood held their general meeting on the 1st ult. A number of questions were dealt with, the principal ones being: "The causes of the fall of wages of watchmakers; the depreciation of the products in the watch industry, and the means of combating this depreciation; the law on the sale and purchase of the precious metals; the exhibition at Antwerp; the Patent Law; the establishment of a permanent exhibition of the various products of the Bienne watch trade at the Bielerhof; the creation of a Russo-Swiss Consulate, to facilitate trade between the two countries; the universal watch, etc."

In spite of the unprofitable state of the Swiss watch trade, new factories are about to be opened in various parts. The *Impartial* says that a new factory will shortly be started at Breleux (Bernese Jura), and a mill at Tramelan is being transformed for the same purpose. The Canton of Lucerne is also about to introduce the manufacture of watches; Mr. Heuer, watch manufacturer at Bienne, has just acquired the necessary ground and motive power at Sursee for the purpose of erecting a watch factory.

The classes recently established for horological instruction at Chaux-de-Fonds have opened under very fair auspices, no less than 80 persons having entered.

Chaux-de-Fonds is being provided with electric clocks. The Cantonal Council has granted a subvention of £800 towards carrying out the scheme.

It appears that the Swiss watch manufacturers begin to see at last the force of judicious advertising. This is probably due to the success which American manufacturers have obtained by the same means. A meeting has been announced at the town-hall at Chaux-de-Fonds to discuss "the best means to attract orders from abroad by means of advertising." Considering the large and influential circulation in Great Britain and all the English-speaking countries beyond the seas of the *Watchmaker, Jeweller, and Silversmith*, we can do no better than advise them to make use of the advertising sheets of this journal.

A curiosity in the way of watches was shown by Mr. E. Sordet, director of the Watchmakers' School at Geneva, before the horological section of the Society of Arts. This wonder is nothing less than a watch with one wheel, manufactured at Paris, in the last century, by a Mr. Gautrin. The watch was presented to the National Institute in 1790, being then in a deplorable state; but the teacher of the repairing section at the school, Mr. Emile James, has, after many hours of labour, succeeded in re-establishing harmony between the various organs, so that it is now in going order. The great wheel which gives the watch its name, occupies the bottom of the case and the centre of the plate; it has 60 teeth, and is 33 mm. in diameter. Its axis carries two pinions, one of which receives the motive force from a barrel, and the other carries the minute work. The function of this great wheel is quadruple. First it acts on a lift, then on a lever operating on another destined to lower the axis of the watch, and lastly on a third lever, the latter serving to return power to the great wheel at the moment when the action relents by the rise of the axis.

The working watchmakers of Switzerland are complaining very much of the various tricks which manufacturers employ in reducing their wages. Besides paying the lowest possible price for their labour, some of the manufacturers make a profit out of the material the workmen have to use, and it is stated that a large factory in the Canton of Soleure even compels their workmen to buy their groceries, etc., in the stores of the factory, which, considering price and quality, they could purchase on much better terms from the shopkeepers. Let us hope, and we believe, that only very few firms stoop to such mean practices.

Like London, Geneva suffers from the abuse of its established reputation as a first-class watch-manufacturing town, and the manufacturers of that city have decided to call the law to their assistance. We are anxious to see how they will deal with this question, as it is one also of great interest to the London watchmakers.

A Bureau of Control has been established at Bienne and St. Imier under conditions similar to those in vogue at other Swiss watch-manufacturing towns.

The German Consul at Rio de Janeiro reports that silver plated ware is more and more replaced in that market by articles of American manufacture. Nickel-plated goods from the United States are particularly well received, not only on account of cheapness, but also because they are better executed and more tastefully engraved.

The Goldsmiths' Company.

UPON the 29th of May, of this year, an event will occur, we believe, without a precedent in the present generation, there will be, at one time, two craftsmen upon the Court of Warders of the Company, viz: Mr. Stephen Smith and Mr. George Lambert, the other wardens being Mr. Trotter (stockbroker), and Mr. Charles Lucas (the eminent builder and contractor). In 1886 and 1887, there will be one craftsman, Mr. Lambert; but in 1888, and 1889, there will not be a single representative of the craft occupying a warden's chair. In 1888 Mr. Lucas will be Prime Warden, and Mr. Hoare and Mr. Pym (bankers), and Mr. Wigan (brewer), wardens; and in 1889, Mr. Hoare will be Prime Warden, with Mr. Pym, Mr. Wigan, and Mr. Williams (of the firm of Williams, Deacon, Thornton and Co., bankers as wardens. And yet, the principal charter of the Company directs that the Wardens *shall* be "elected by the trade," and *shall* be "true, honest, and sufficient men, best skilled in the said trade."

Out and About.

By P. Howard.

WHAT is it that is always kept perfectly dry, although there is a running spring in it all the time? Why, a watch, to be sure!

A Hard Case.—A watch's.

"The Silent Watches of the Night."—Those left unwound.

A girl named Mason has been remanded at Northampton on a charge of stealing jewellery. She is no longer a Free-Mason now.

I see that a man has recently married his aunt. Well, now that he is his own uncle, I hope he will wear his watch regularly.

During the month of November last, £246,854 worth of rough and uncut diamonds were exported from the Cape. Of course, this is the amount of the *total* exports.

The capital watchmaker's and jeweller's shop at 27, Sand Hill, Newcastle-on-Tyne, fitted throughout by Sage, of London, and occupied for over twenty years by Mr. Oliver Young, is to let at a very moderate rent and good terms.

Five hundred dollars is a stiff price for a pair of shoes; yet this was paid by a New York belle recently. They were made of white satin, and splendidly embroidered with real pearls.

I take the following advertisement from the *Sporting Chronicle* (Manchester) of February 2nd, 1885, and I guess the advertiser wants to be in good time for Christmas:—

> A FEW Valuable WATCHES, Diamonds, Gold Chains, Alberts, etc., WILL BE SOLD Very CHEAP for Christmas Presents.—56, Oldham Road.

In the same city, Mr. L. Beaver, a high-class jeweller, at 37, Cross Street, is advertising electric scarf-pins, complete with accumulator, at 35s. each, and he guarantees them to give a perfect electric light.

Talk about cutting things fine! I was awfully surprised at Leeds the other day to find that a good tradesman like Mr. John Allpass, of 5, New Briggate, was offering English lever watches *at 2s. per week!*

Messrs. T. and J. Bragg, of Birmingham, have manufactured the first mayoral chain and badge for the newly-incorporated borough of Bacup, Lancashire. The chain is the present of Mr. James J. Sutcliffe, and he is highly pleased with the style and workmanship of it.

People might do worse than take a wrinkle from Mr. W. Burnett, jeweller, Jarrow-on-Tyne, because he issues a monthly list of second-hand goods of all kinds, including watches, jewellery, silver plate, etc., etc., free of charge.

"Tell me, Mary, how to woo thee" is the title of a very well-known ditty. I should like to suggest that the fellow who was wooing should try what a diamond necklet and locket would do by way of a start. If that failed, he might try something else.

Lewis's, the dealers in everything, from shoe-laces to treacle, went into the watch trade a little while ago at their large stores in Liverpool, and now they have extended their operations to clocks. They are selling "Ansonias" at about cost price, and advertising them extensively.

Quite recently I saw a taking novelty exposed for sale in the windows of Messrs. Piggott and Grosser, No. 8, Lower Hillgate, Stockport. The article was a silver scarf-pin made of a threepenny-piece, one side of which had been planed and polished and then engraved with the Lord's Prayer complete. The price was only 3s. 6d. each.

A marvellous clock, seven feet high, has just been made by a blacksmith at Leesville, Ohio, without the help of anything other than the tools of his trade. It is all forged steel, strikes the hours and quarters, gives the time in eleven different cities all at once, and is so exhibited in a glass case as to allow the whole movement to be seen.

By a resolution on the part of the powers that be, it has been decided to stop the chimes of the clock in the Albert Tower, Hastings, between eleven o'clock at night (23 o'clock) and five in the morning, on the grounds that the noise caused by them is a public nuisance.

An improved kind of plated ware has been patented by Mr. William A. Warner, of Syracuse, N.Y. The improvement is more especially designed for articles such as spoons, forks, etc., and covers a novel means of plating, whereby the portions most exposed shall receive a heavier plate without making apparent any extra ridge or film of metal at such places.

What a capital name for a jeweller's shop! Mr. E. Fear, of Bristol Bridge, Bristol, calls his establishment the Golden Cupid, and there caters for the requirements of moon-struck ladies and gentlemen, by offering wedding and keeper rings of *all* prices, *all* sizes, *all* patterns, and *all* Government-stamped.

Of few persons can it be truly said that they are "worth their weight in gold." Such a treasure, however, seems to have been possessed in the shape of a wife by the late Mr. George Gardner, of Boston and Beverly, in the United States, a recently deceased millionaire, whose will was filed at Boston on the 8th inst. Its provisions were of a peculiar and touching nature. There were no public bequests; but the bulk of Mr. Gardner's property was left in the hands of trustees. They are directed to pay to his wife each year 1,161 troy ounces of pure gold, and, in addition, if she wants it, 10,000 dols. cash. It is stated that when the will was made this quantity of gold represented his wife's exact weight, which was between 90 lb. and 100 lb. avoirdupois. The remainder of the income of his estate is to be divided among the relatives of the deceased without reference to their bodily proportions.

Rochdale is minus a Town Hall clock since the fire fiend nearly demolished that splendid edifice. As a consequence, the Pioneers Co-operative Society's clock became the borough regulator; but just now it is out of gear. The local papers are asking what prevents the clock belonging to the Pioneers being set a-going? For several months now it has not shown the time, and the inconvenience to the public is all the greater since there is no clock in the Town Hall. It is to be hoped a portion of the "divi" will be set apart for the purpose.

The Art of Metal-Working.

(*Concluded from page* 116.)

THE most beautiful of all Pisano's medals is, however, the one struck in honour of Vittorino da Feltre, who spent his life in teaching youths; the high moral tone he inculcated and the refined style of knowledge produced some of the brightest men of the age, and went far to counteract the downward tendency which followed in the rule of the despots. This medal has the portrait of Vittorino da Feltre on the obverse, and on the reverse a pelican feeding her young from a wound in her breast—a symbol of self-sacrifice.

A strong poetic feeling and mystic imagination is apparent in all Pisano's medals. The intensity of meaning is only equalled by the exquisite simplicity and truthful form in the reliefs of the reverse.

Though we may call Vittore Pisano the father of the commemorative medal, the Florentines were, long before his time, famous for the beauty of their coins. The gold florin—which was struck in A.D. 1252, in commemoration of victories over Pistoja, Pisa, and Siena, and which has St. John on the one side and the fleur-de-lis on the other (the city and its protector)—was known and admired all over Europe. Chaucer, in the "Pardoner's Tale," takes it as a model of beautiful money, and Villani tells a story of how the Tunisians gave the Florentines the freedom of the city and trade privileges hitherto enjoyed only by Pisa, because they so admired their gold florins. There was an interesting variety made in the obverse in the thirteenth century. The Florentines obtained another victory over the Pisans, and on the very spot altered the coin to commemorate it. A tree was cut down—emblematic of the fall of Pisa—and, using the stump for an anvil, they struck some new coins, adding a little relief of a tree underneath the St. John. This is a significant proof of the primitive practice of gold-working at that period. It required as little paraphernalia as the Indian goldsmith, who will sit at your door and fashion ornaments out of a gold sovereign.

After Pisano's time, many artists turned their attention to medals. A fine fifteenth-century specimen is that with the bust of Savonarola, which is inscribed, *Hieronymus Sar. Fer. Vir. Doctis.* Antonio Pollajuolo made the dies for the famous medal of the Pazzi conspiracy; but, however fine the workmanship, it is impossible to look on the design as artistically harmonious. On one side is the bust of Lorenzo de Medici, on the other that of Giuliano. These gigantic busts are placed in the centre of the octagonal choir of the Duomo, and around the choir the story of the murder is told in a number of diminutive nude figures. The effect of these nude figures, as contrasted with the robed priests within the choir and the immense busts above, is more curious than pleasing.

Giuliano da San Gallo struck the medal of Giovanni delle Bande Nere, which shows great energy and decision in the cutting. Another of his was that with the effigy of Alessandro de Medici, with the curious reverse of a rhinoceros and the motto, *Non belvo sur vincer.*

Domenico Pazzi was another medallist; to him is due the medallion struck for Pope Sixtus V. in 1590, on which is the portrait of the Pope's sister, Camilla Peretti. A little later, Leone Leoni, of Arezzo, made a reputation by the fine medals struck in honour of Charles V., with the reverse of Jupiter launching thunderbolts at the Titans, and by a no less famous bronze statue of the same monarch, which was cast as a nude figure and clothed in movable armour. The emperor's right foot rests on a chained figure holding a torch, representing Anger or Fury. On the pedestal is the inscription, *Cæsaris Virtute Furor Domitus.* For these and other fine works in bronze, Charles V. gave Leone a house in Milan and a pension of 150 ducats a year, besides creating him Cavaliere. Leone's son, Pompeo, followed in his father's footsteps, and is known by his medal of the young Carlo, son of Philip II. of Spain, the unfortunate prince who died in boyhood, having incurred the hatred of his father.

Nor did Michelangelo himself think this branch of art beneath him, for he struck a medal in honour of Bindo Altoviti, who, with his family, had rendered great assistance to Florence at the time of the siege. This Bindo Altoviti was a patron and friend of almost all the artists of his time. He had a kind of bank in Rome, on the piazza near Ponte Sant Angelo. Benvenuto Cellini cast a bronze bust of him, life size; Raphael, Santi di Toto, and Salviati all painted his portrait; and now Michelangelo strikes his medal. The obverse has a fine profile of him to the right—a noble, classic face, slightly past middle age, in which can be traced the more matured lineaments which Raphael has depicted in the youthful portrait with long fair hair and blue eyes. The reverse has a standing figure of Prudence sustaining the falling column of the liberty of Florence. There is a good deal of Michaelangelo's love of well-developed limbs in the figuro of Prudence, but the draperies are free and graceful. Guido Reni, many years after, seeing the medal in the house of Cardinal Giulio Sacchetti, with whom Monsignor Jacapo Altoviti was staying, was so charmed with it that he copied the head, life-size, in a crayon, and afterwards made a painting of it, which he presented to one of the Altoviti family, Patriarch of Antioch. The portrait is still in the Palazzo Altoviti; but Bottari says the medal is lost. An Italian antiquary, Lorenzo Pignora, writes, in 1744, however, that he saw in Brescia, "un testone di bronze di Michelangelo," which he believes to be the Altoviti medal. Signor Moreni, who published a book on this medal in 1824, evidently believes that a copy in his possession is the original.

The portraits of Pastorino, of Siena, who invented a very hard kind of stucco which would carry colour, were curiosities in the art of medallion making. He took the portrait of nearly all the celebrities of his time in medallion form, coloured from nature so naturally that Vasari says they "seemed alive."

His talent was not wholly confined to this low art, however, for he was also famous for his medal dies cut in steel. There was a general fashion in the sixteenth century for medallion-portraits modelled in wax. The two most noted artists were Giovanbattista, of Siena, and Rosso de Gingni of Florence.

Donatelo's scholar, Bertoldo, afterwards director of Lorenzo's art school in the Medici Garden, acquired great fame by his medal of Mehemet II. The reverse has a triumphal car of Victory, dragging three nude figures enchained as captives. There is splendid modelling and great classic beauty in these graceful figures.

A very artistic medal, dated 1505, has the portrait of the youthful Lucretia Borgia, then wife of Alfonso d'Este, at Ferrara; the reverse is a figure of Cupid, bound blindfold to an apple-tree, his broken quiver and unstrung bow hanging useless on the branches. This is now in the Berlin Museum, and is engraved in T. Gregorovins's "Lucrezia Borgia." It is strange that, some years later, Titian took the same subject in a painting for Duke Alfonso, "The Garden of Venus."

This medal may have been the early work of Gio. Bernardi di Castel Bolognese, whose first remarkable works in intaglio and die-cutting were done in Alfonso's service. He afterwards cut some fine medals for Pope Clement VII., one of which has a beautiful reverse of Joseph making himself known to his brethren. Charles V. paid him "cento oloppie" (gold doubloons) for a medallion, and would have taken him to Spain, but the artist would not leave Rome.

Perhaps the most famous medal of the sixteenth century was that of Paul III., by Alessandro Cesati, called Il Greco. The reverse is Alexander the Great doing homage at the feet of the High Priest of Jerusalem. Michelangelo gave vent to one of his prophetic utterances on seeing this medal; he said, "The hour had arrived for the death of Art, as it was impossible to produce anything better than this."

Another medallion by Il Greco was that of Julius III., for 1550, the reverse of which is the release of the prisoners in the year of Jubilee. He made a splendid portrait of Cardinal Farnese, the head being of gold on a silver ground.

One of the most extraordinary works of art produced in the sixteenth century is a clock now in the Museum of Natural History (Galileo Rooms) in Florence. It was made for the Grand Duke Ferdinand de' Medici, about 1578. The outer case is of the finest work in gilt metal. It is partly pierced and partly *repoussé*. The pierced portions are rich with arabesques, alternated with astrological and mythologicl figures; four silver griffons crawl from the centre towards the corners at the summit, on the apax of which is a tiny statuette. The base is very richly and finely worked; but what is to be said of the mechanism which moves the different actions on the seven dials of this wonderful clock? The largest central one is an astrolabe, the revolving orbits of which show the movements of the planets, the moon, and (apparent) course of the sun for the entire year. Other dials indicate repectively the lunar year, lunar month, the days, hours, minutes and seconds.

It is interesting to see how during the fifteenth, but especially sixteenth century, the Florentine of the Republic lived a very frugal life in the house, and kept all his display for festive or public occasions. It has been said that he was Cato in the house, and Lucullus in the city. Yet every householder laid by his wealth in the form of jewellery or vessels of silver, till his *cassoni* and he had riches enough to dazzle the eyes of his neighbours at his wedding feasts and on festal days. For ordinary use brass or pewter sufficed; yet even to these a touch of art was given by a little medallion of silver let in, and inlaid with the armorial bearings of the family in niello or smalto. In the time of the Culmination, however, this traditional frugality was cast aside; the humanistic Florentine so loved beauty and art that he wished it always before him. He superseded his locked chests with carved sideboards, and displayed the family treasures of chased silver and painted porcelain on its shelves, bringing out their beauties by crimson velvet cloth spread beneath. He sometimes made daily use of his beautiful things. Here is Vespasiano's account of Niccolò Nicoli, the bibliophile:—

"When he was at table his wine was served in beautiful antique vases, and the table was full of porcelain dishes or other lovely things. He drank either from a cup of crystal or other rare stone. To see him at table, antique as he was, was an ideal of refinement."

The great use of plate at table is to be seen in the inventory of silver basins and vases of the Signoria, it being the custom for the Gonfaloniere and Signoria to dine together every day at the Palazzo Vecchio.

The Medici inventory is also rich both in silver plate and majolica; the greatest art was lavished on the *bacino*, which, according to the Classic fashion, was handed to the guests in which to wash their hands. One *armadio* in Lorenzo de' Medici's house contained six of these basins and nine silver ewers. They were decorated with classic or poetic subjects in niello, smalto, or repoussé. One or two exquisite specimens, supposed to be by Cellini, are in the "Argenteria" of the Pitti Palace. The greatest fancy was displayed in the handles of knives, which were gold or silver, enriched with stones or crystal; sometimes they were carved in ivory or ebony, or bore chivalcresque devices on them in enamel.

To De-Magnetise the Steel-work of a Watch.

THE following method of removing the magnetism from a watch that has been accidentally brought under the influence of a powerful magnet is proposed by Professor A. L. Mayer in the *Scientific American*,[*] to which the reader who who is desirous of obtaining complete details must be referred. We shall not here enter more fully into the subject than is necessary to indicate the manner in which a watchmaker may restore the steel work to its original condition.

Take a delicately-suspended magnetic needle—say a mariner's compass, the length of which is about equal to the diameter of the watch—and lay it on a table. Now place the watch to be operated on (which should not be going) on the table close to the needle, and on either the east or west side of it, having previously turned the box round until the needle points to zero. Taking care not to vary the distance between the centres of the watch and compass, observe the number of graduations to which the north end of the needle is deflected, with each figure on the dial brought in succession nearest to the compass; it is also necessary to note whether the deflection is towards the east or west. For example, assume that the watch is on the east side, and that with noon nearest to the compass, the north end of the needle is turned 12° to the east, that is, towards the watch. This shows that some point in the watch in the neighbourhood of the number XII. on the dial, possesses what is known as "north polarity;" and, if the deflection had been to the west, the polarity would have been south.

To take an example. Let the results of a series of trials, with the several hours in succession towards the compass, be as given in the following table:—

Hour nearest to the Compass	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	XI.	XII.
Angle of Deflection ..	5°	18°	72°	56°	22°	5°	17°	16°	16°	20°	24°	20°
Direction of Deflection .	E.	W.	W.	W.	W.	E.	E.	E.	E.	E.	E.	E.
Hence Polarity is	N.	S.	S.	S.	S.	N.	N.	N.	N.	N.	N.	N.

It will be seen that the greatest deflection westward corresponds to three o'clock, and in the easterly direction to eleven o'clock. This shows that the strongest south and north polarity are respectively in these directions. The first thing to be done is, then, to eliminate this particular magnetism. Placing a bar magnet in a horizontal direction, approach the watch to its south-seeking end in such a manner that a line (XX) through the axis of the magnet will pass through the centre (C) of the watch, the figure XI., which marks the point of extreme north polarity, being nearest to the bar magnet. Now cause the watch to oscillate so that

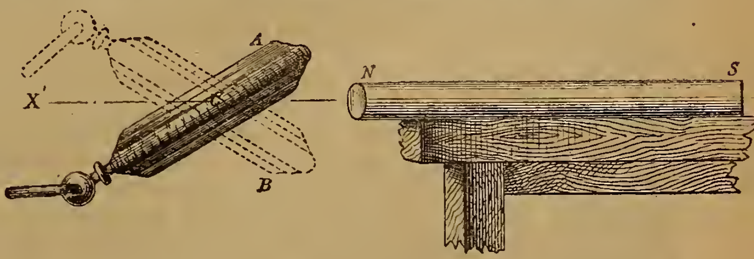

Fig. 22.[†]

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[*] Vol. 41 (1879), p. 227.

[†] We are indebted to Mr. J. Tripplin, the proprietor of the "Watchmakers' Handbook," for the use of this block.

it alternately takes up the two positions A and B, and, when this has been several times repeated, bring III. in a similar manner near the north-seeking pole of the bar-magnet, oscillating the watch in the same way. Again try the watch with the compass, repeating the above operations, if necessary, until the readings are somewhat as follows:—

Hour nearest to the Compass	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	XI.	XII.
Angle of Deflection ..	5°	4°	0°	5°	8°	2°	4°	4°	2°	1°	0°	2°
Direction of Deflection .	E.	E.	..	W.	W.	W.	E.	E.	E.	E.	..	E.
Hence Polarity is	N.	N.	..	S.	S.	S.	N.	N.	N.	N.	..	N.

These figures show that, in counteracting the polarity at III. and XI., the magnetic action of the watch in all other positions, as might, indeed, have been anticipated, is materially diminished. Such a condition of things will, of course, not be attained at once; and it may even happen that the polarity at the two points III. and XI. is reversed. In such a case, it is only necessary to oscillate the III. in front of the south-seeking pole instead of the north.

The last table shows that a maximum south polarity is now at V., and north at I. These points must, therefore, be operated upon in the same manner; and by proceeding in this manner, and successively eliminating the worst points, the magnetism may be effectually removed.

As proving the efficacy of the above method, Professor Mayer mentions a case in which a watch lost one hour in six in consequence of magnetisation, and yet, after the above treatment, it resumed its original rate of about a second per day.

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Errata.

AMONG the list of patents given in our last issue, a patent is there described as having been taken out by Francis George Swinden, of 6, Livery Street, Birmingham. As this gentleman is a member of the firm of Messrs. Swinden & Sons, we are requested to say it should have been 27, Temple Street, Birmingham.

◆

Free International Institute for Commerce, Trade, Industries, Agriculture, etc.

130, FLEET STREET, LONDON, E.C.

THIS institute has been established for the purpose of affording a medium for discussion of any commercial, trade, industrial, literary, etc., question without the formality to be observed in respect of other institutions and societies. It is open every day, and public meetings are to be held without delay to suit the convenience of those directly interested in the question to be considered.

The fact of free membership will render it truly serviceable to all.

The respective branches of industry are indebted to Mr. C. E. Parker-Rhodes for its establishment, and in this period of serious depression of trade throughout the kingdom this initiation of an institute free to all, will be of inestimable value, and we can safely predict for it great success after the preliminary steps have been got over, and the many difficulties inherent in such a work have been conquered. One great feature in favour of this single-handed effort of Mr. C. E. Parker-Rhodes, who is in no way hampered by trade interests, is that this Free International Institute, although intended to deal with every British interest brought under its consideration, does not encroach upon ground covered by existing institutions, and that the personal services are purely honorary.

Mr. Parker-Rhodes's long experience in all international questions, in the Consular service, in public matters both local and national, together with his long list of literary and commercial works, are a guarantee of his ability to make the institute of which he is the founder, profitable to all interests, including the wage-class. Besides works on "The True Position of the Suez Canal," "The French Maritime Commercial Directory," "Rival Statesmen," "The Board of Trade and its Work," "Our Treaties of Commerce," "The Metric-Decimal System," "Our Weights, Measures, and Money Currency," "The Water Supply of the United Kingdom," Mr. Parker-Rhodes is now preparing an Essay on "Horology."

◆

Legal.

AT the Birmingham Police Court—before Mr. Kinnersley (Stipendiary)—Thomas Petty, seventy-two years of age, metal melter, Monument Road, was charged with stealing a quantity of jewellery belonging to his employers, Messrs. Bishton and Fletcher, jewellers, Albion Street.—Prosecutors having for some time missed a quantity of gold and jewellery, communicated with the police, the result being that detective-inspector Cooper found the prisoner to be the culprit. On searching a box at prisoner's house the officer found 25 oz. of pure gold and jewellery to the value of over £100.—Mr. Stubbins said that the prisoner had made every restitution in his power, and in consideration of his old age the prosecutors would offer evidence only on a charge of stealing an article of jewellery, value 12s. 6d.—Prisoner pleaded guilty.—Mr. Hebbert asked for leniency, a request in which the prosecutors joined.—The Stipendiary passed a sentence of three months' imprisonment without hard labour. In addition to restoring the whole of the property found in his possession to the prosecutors, the prisoner handed over £98, which he withdrew from the bank. The total amount of the robberies is estimated at between £300 and £400.—Mr. Stubbins, on behalf of the prosecutors, thanked the police, especially detective Cooper, who was solely instrumental in discovering the robbery.

NATHANIEL GALE, a jeweller's traveller, of Great Yarmouth, has been arrested on a charge of embezzlement.

DARING JEWELLERY ROBBERY AT HEREFORD.—A man, at present unknown, entered Mrs. Kleiser's shop, Commercial Street, Hereford, recently, and stole therefrom a quantity of rings, of the value of £100, which were exposed for sale on a tray. As the man was walking down the street towards the railway station, a neighbouring tradesman, Mr. S. Cole, observed a number of rings fall from the person of a passenger. Mr. Cole picked the rings up, and handed them to the man, who said that he had been selling rings in the market. A suspicion being aroused in the mind of Mr. Cole, he went to Mrs. Kleiser's shop, and on examination being made it was sound that a tray containing rings was missing. The police were informed of the theft, and it being ascertained at the railway station that a man had, immediately before the train started, booked for Stafford, and as the description of the man obtained at the station agreed with that given by Mr. Cole, a telegram was despatched forward for the man to be detained. The man was arrested at Craven Arms, and brought to Hereford on Thursday for the purposes of identification. Prisoner proved, however, not to be the man whom Mr. Cole saw in the street. The robbery has been notified at all the principal police stations.

Lecture on Universal Time.

By J. Norman Lockyer.

(Continued from page 126.)

THE cross wire in the telescope marks the middle of the field in view, and as we move the telescope from the north overhead to the south, that cross wire really draws a line along the heavens from the north pole to the point overhead, and towards the south, and it is to this central cross wire that the movements are referred. This diagram represents very much what you see at twilight. We will move the stars a little, so that you see one of them crossing the central wire; they are all moving very slowly, and you see one has now reached the central cross-wire. The astronomer notices the exact time at which that happens, and he says that star is crossing the meridian. At Greenwich, in the transit instrument there, when the star crosses the central wire, they say the star crosses the meridian of Greenwich; at Paris, it crosses the meridian of Paris; at Washington, the meridian of Washington, and so on; and if it were the sun instead of a star, we should note the time when the centre of the sun passed that central wire, and then we shall say the sun was passing the meridian of Greenwich, of Paris, or Washington, as the case may be. As a matter of fact, the observations are made at all the wires and at both edges of the sun, but I have only told you what the astronomer tries to arrive at by means of these observations.

"Well, now we know what the word meridian means, and there are some very important considerations to be borne in mind in regard to it. I told you that the stars were an awful distance away. What have we to do with that? We have this to do with it, that if the stars are very far away indeed, they will always seem to be in the same direction, wherever we look at them from. Some of you may say—Well, the earth is always in the same place, although it is turning on its axis, spinning like a top. But this is not true, the earth is not always in the same place, it travels round the sun while this spinning which I have demonstrated to you goes on; but although the earth goes round on its axis once in a day, and gives us, therefore, the day and night in twenty-four hours, it takes a whole year for it to go round the sun. We can prove most decidedly that it goes round the sun just as we can prove that it spins like a top, but I have not time to show you how that is done to-night. I have here several small globes representing the earth in different positions of its orbit round the sun; owing to the want of space, they have been placed in a very flattened circle, but in reality the path of the earth round the sun is very nearly a circle. Now I want to show you how it is that the stars always appear in the same direction from whatever part of the earth's orbit they are viewed. I have from each globe a string stretched, and I want you to understand that they all really point to some place a long way off. You see in a moment that they do not point to anything in this room, or even to anything in the next street, but you can imagine, I think, that if they point to a spot, say in Edinburgh, they would be practically what we call parallel, that is to say, the strings would have to be so very long, that the few yards they are apart here would be spread over 400 miles, so the difference in the distance between any two strings at one end of the table and at the other would be something so very small that we could not measure it. Practically, therefore, they would be parallel to each other, and if I were to look at St. Giles, Edinburgh, from the end of one string, or from the end of the other, I should see it in exactly the same direction, whereas, of course, if I looked at anything in the next room from these two points it would appear to be in a different direction altogether. Now, if that is so, see what happens. We suppose that these three globes represent the earth in its path after an interval of twenty-four hours; the first representing the position to-day, the next to-morrow, and the next the day after. Now, with the transit instrument mounted on the globe, I can observe the same star after an interval of twenty-four hours. That is what astronomers do, and observatories exist to enable such observations to be made; and the interval between the times when the same star crosses the meridian is called star or sidereal time, and there are clocks made expressly, so that from any one star being on the meridian on one particular night, to the next night there shall be an interval of exactly twenty-four sidereal hours intervening. Sidereal time, then, has to do with the stars, and is such that we have twenty-four sidereal hours from the transit of a star in the way you have seen on one night to the transit of the same star the next night. Now, you understand that when one part of the earth is having midnight, the opposite part is having midday. Here are two globes representing the earth in opposite positions in the orbit. From these two positions of the earth there are strings drawn going to the same star, and you can easily see that after six months we get the transit of the star at noon instead of midnight; that when we get the transit at one place at sunset, the same star would be visible at another place at sunrise, so that this star time would land us in very considerable difficulties, and 12 o'clock star time would mean every part of the day in succession. 12 o'clock star time would be night in one place, would be noon at another, and sunrise at another. It really comes to this. We must have something which has to do, not with the distant stars, but with the big star which is near us; we must regulate our clocks with reference to the sun, so that when the sun is south at noon we may say, as we do, that it is 12 o'clock; we must call the middle of the day the same hour and we must call the middle of the night the same hour all over the world. How inconvenient it is, for instance, when we go down to the seaside, not to have the tide wound up in that way. We have to make all our arrangements about bathing, and going round the rocks, and so on, and the tide varies every day. It would be much more convenient if we could have it high water the same time every morning. There is a case in point where we have a period which varies from that which regulates the usual requirements of our ordinary every-day life. Now, what do we do with regard to star time. We use this star time to take us to something else, and what the star time takes us to is this. [The lecturer then illustrated by means of the model globe the fact that the earth has to make rather more than a revolution to complete the solar day.] You see, then, if we must have a time which depends on the sun, the near star instead of the remote ones, and if that time is to be twenty-four hours like the other; the hours, the minutes, and the seconds must be longer, and as a matter of fact we have that time, and that is called mean civil time. It is so arranged that the twenty-four hours are reckoned from an average sun all the year round, so that, as near as may be, 12 o'clock means the middle of the day for every day in the year, with the sun to the south. Those hours, minutes, and seconds must be longer than the hours, minutes, and seconds of sidereal time, because the earth has not only to get back to the same place, and to be in the same position with regard to the star, but it has to go a little further to arrive at the same position with regard to the sun.

(To be continued.)

Wise or Otherwise.

AN OLD CLOCK'S EXPOSTULATION.

I.

Say, what is all this tale I hear
About the change of time,
Or reckoning?—in this new year,
Am I to change my chime?

II.

It seems to me that it will be
A serious delusion;
And also I can plainly see
'Twill cause a great confusion.

III.

Most faithfully I've told each hour
To generations past and gone—
Oh! for the good old days of yore
When after twelve again came one!

IV.

I'll strike at once—I will rebel,
I never will strike twenty-four;
To every one the truth I'll tell,
As from my youth I've done before.

V.

Each day and night twice made my round,
For full two centuries past,
And now, in my declining age,
They've found a fault at last.

VI.

It seems to me that now-a-days
Both hours and days are wasted,
In trying to find out new ways,
When old ones should have lasted.

VII.

With my experience, I have said
I feel myself insulted,
That ere this novel change was made
I never was consulted.

VIII.

I dread the work that I must do—
To strike fourteen instead of two!
And fifteen at the hour of three,
'Twill tire old folk as well as me.

IX.

Then sixteen comes, oh! what a bore
To strike sixteen instead of four!
For seventeen I then must strive,
Which once was only simple five.

X.

Then eighteen comes, and people fix
This hour to dine, instead of six;
Nineteen the next, instead of seven,
'Tis odd!—ne'er mind, the next is even.

XI.

Now twenty comes, which eight should be,
I fear 'twill be the death of me;
At twenty-one some few may dine
Who choose the later hour of nine.

XII.

Now twenty-two instead of ten!
When will my striking cease?—oh! when?
The next to strike is twenty-three,
And soon my work will ended be.

XIII.

For this I've said, and say once more,
I *never will* strike twenty-four,
I'll go my round twice as before
That all may understand,
But *never* will strike twenty-four.
Witness, my hand. 1 a.m.,
1st January, 1885.
And now I bid old friends good morning!
Before I strike I've given warning.

◆

Queries and Replies.

Will any reader inform me how to gild gold jewellery below 14 carat, silver, nickel and alloys, without injuring the articles.—T. W. Burnley.

Could you inform me of any method of demagnetising steel work, and thereby save expense of putting in new pieces. Your answer will greatly oblige.—J. A Gourlay.—[For an answer to this Query, see page 139.]

◆

Miscellaneous.

Fresh discoveries of silver are continually being made in various parts of New South Wales, several being of great richness, and there is every prospect of the colony taking a leading place among the great silver-producing countries of the world, if it is not destined to prove a formidable rival to the great silver-producing districts of North and South America. The population of Silverton, which a couple of years ago had no existence, now exceeds 5,000, the town having large stores, hotels, a theatre, etc., and a weekly newspaper, the *Silver Age.* Capital to a large extent has been subscribed for working the mines, and Silverton is likely to become one of the largest and most flourishing towns in the colony. The quantity of silver ore raised at the mines at Silverton to the end of September, 1884, was 5,115 tons, valued at £116,590. Another estimate considerably exceeds this. Mitchell's Creek, the centre of another great silver-field in New South Wales, is in future to be called "Silver City." The first silver-smelting furnace in Australia has just been constructed at the Sunny Corner Silver Mines. Four years ago these mines could have been purchased for £2,000. Now the proprietors have refused an offer of £200,000.

Sale of the Countess of Seafield's Jewels.—Recently, at Edinburgh, Mr. Dowell sold the second half of a collection of jewels and gold and silver plate, a large portion of which belonged to the late Countess Dowager of Seafield. Dealers were present from London, Liverpool, Manchester, and Newcastle. A suite of rare old brilliant diamonds sold at £810. The suite consisted of a necklace, with centre-piece, and two rosettes, scroll brooch, and corresponding earrings, there being 65 principal stones and many minor stones. An old necklace of 58 principal Oriental diamonds in a French silver setting sold at £610. A necklace of 67 pearls, of good form and lustre, with a gold snap set with emeralds and brilliants, brought £320, and a bracelet of 28 diamonds £210. This bracelet and the necklace which sold at £610, originally belonged to the Orleans Family. In the other lots a gold flexible band bracelet sold at £350, a cross emerald and diamond brooch at £195, and a set of five diamond star brooches at £200. The price for the gold and silver plate varied from 5s. to 22s. 6d. per ounce.

Balloon Society of Great Britain.—The popular Scientific Literary and Art Society.—Persons desirous of reading papers, or joining the society as members, are requested to communicate with the secretary, 26, Budge Row, Cannon Street, London, E.C.

A valuable paper on the "Science of Salesmanship," in our January issue, has, by inadvertence, been attributed to the Chicago *Watchmaker and Metal-worker*. It is due to our esteemed contemporary *The Manufacturing Jeweller*.

◆

Bankruptcy Proceedings, &c.

Burgess, Thomas, 29, Barford Street South, Birmingham, Jeweller. £33 11s. 6d. Nine creditors. February 5th. No. 333.

Juler, Miles, York Road, Great Yarmouth, Watchmaker, &c. February 9th. Examination at the Town Hall, Great Yarmouth, on March 9th, at Half-past Two.

Manning, Frederic, 64, High Street, Worcester, Jeweller, Discharge refused. January 15th.

Pinder, Charles, 44, Bark Street, Bolton, Watchmaker and Jeweller. February 5th. Examined at the Bolton Court on February 25th.

Rogers, Abraham, 61, Burton Crescent, Euston Road, St. Pancras, London, Jeweller. February 16th. Examination at 34, Lincoln's Inn Fields, London, on March 24th, at Eleven.

Skee, George Houlsby, Green Street, South Shields, Watchmaker. £41 10s. 9d. Ten creditors. February 5th. No. 4.

Van Dieren, Hermann Joseph, 262, High Holborn, London, also 57, King's Road, and 11, Black Lion Street, Brighton, Manufacturing Jeweller, &c. January 31st. Examination at 34, Lincoln's Inn Fields, London, on March 10th, at Half-past Eleven.

Vincent, William St. Andrew, Clifton Place, Hayward's Heath, Watchmaker's Assistant. February 19th. Examination at the Brighton Court, on March 12, at Twelve.

Watts, Benjamin Clement, 7, Gold Street, Roath, Cardiff, Working Jeweller. January 24.

◆

Dissolutions of Partnership.

Allison & Lonsdale, Victoria Works, Sheffield, Electro-Platers. February 20.

Harrold, Charles & Co., St. Paul's Square, Birmingham, Refiners, &c. December 31st, 1884, as regards Charles Harrold. Charles Westwood continues alone.

Newmark & Abrahams, 128, Houndsditch, London, Wholesale Jewellers and Dealers in Fancy goods. February 9th. Debts by Barnett Henry Abrahams.

Phillips, Israel, & Co., 49 and 57, Lime Street, Liverpool, Watchmakers and Jewellers. January 28th.

Wilkinson, Bros., Newark-on-Trent, Silversmiths, &c. January 1st. John Thomas Wilkinson continues the business of Pawnbroker, and Martin Wilkinson continues the business of Silversmith, &c.

◆

Bills of Sale.

Charman, William Henry, The Cottage, Cox's Lock, Ham Moor, Addlestone, Chertsey, Jeweller's Traveller. February 2nd. £100. Given to William Dix.

Clarke, Joseph, 44, Robert Street, Cheetham, Manchester. Jeweller's Traveller. January 30th. £50. Given to Isaac Goldman.

Dorey, Thomas, 7, Camberwell Park, Camberwell, Jeweller, etc. February 12th. £100. Given to Henry R. Smith.

Kennedy, Philip, Earl Street, Hastings, Electro-Plater. January 26th. £30 5s. 8d. (Absolute sale). Given to Jane May.

Martin, Alfred Heap, 19, Royal Hill, Greenwich, Silversmith. January 29th. (Agreement.) Given to W. Woodman & another.

Martin, Alfred Heap, 19, Royal Hill, Greenwich, Silversmith. January 29th. (Agreement.) Given to W. Woodman & another.

Rowden, Charles John, High Street, Chipping Ongar, Watchmaker January 24th. £31. Given to Charing Cross Bank.

Thomas, Alfred, Dart Cottage, Tievingcy Terrace, Redruth, Watchmaker. January 24th. £34. Given to Thomas Davey.

◆

Applications for Patents.

540.—**Philip Bettle**, 6, Bream's Buildings, Chancery Lane, London, E.C., for "Improvements in clocks and watches."—Dated 14th January, 1885.

581.—**Victor Ludwig Alexander Blumberg**, and **Charles Nathaniel Blumberg**, 11, Wellington Street, Strand, London, for "Improvements in clock or timekeepers."—Communicated by Monsieur Redier, Paris. —Dated 15th January, 1885.

602.—**Henry Ellis**, 55, Chancery Lane, London, for "Improvements in watches, clocks, or such like timekeepers."—Dated 15th January, 1885.

612.—**Francis Preston**, 4, Mansfield Chambers, 17, St. Ann's Square, Manchester, for "Improvements in or relating to dynamo-electric machines."—Dated 16th January, 1885.

682.—**Walter Nathan**, 55, Basinghall Street, London, for "Improvements in the spring inside of a bracelet case to hold the bracelets."—Dated 17th January, 1885.

700.—**John Severin Johnson**, 166, Fleet Street, London, for "Improvements in watches and clocks for denoting the day of 12 or 24 hours."—Dated 17th January, 1885.

721.—**Edward Henry Cashmore** and **Fred Walter Mole**, Cobden Chambers, Corporation Street, Birmingham, for "Improvements in boxes suitable for the backs of brooches, lockets, and other articles of jewellery."—Dated 19th January, 1885.

767.—**James Cooke**, 6, Livery Street, Birmingham, for "Improvements in clocks, watches, and other time-keepers."—Dated 20th January, 1885.

789.—**Harry Downing**, 53, Chancery Lane, London, for "An improved dial or face for watches, clocks, or other time-keepers, to indicate the old and new notation of time."—Dated 20th January, 1885.

801.—**Harris Conley Wilkinson**, Surrey Chambers, 172, Strand, London, for "Improvements in making new dials or faces of watches, clocks, time-pieces, and chronometers, and in adapting ordinary dials or faces, whereby the time both by the ordinary computation of twelve hours and by the proposed new computation of twenty-four hours may be denoted and easily distinguished."—(Complete Specification.)—Dated 20th January, 1885.

856.—Morris Laurence Levy, 4 and 5, Arcade Chambers, Corporation Street, Birmingham, for "Improvements in watches, clocks, and other time-pieces."—Dated 21st January, 1885.

921.—Joss Dyson, 1, Commercial Street, Halifax, Yorkshire, for "Improvements in the method of and apparatus for denoting the time in clocks and watches arranged on the twenty-four hours system."—Dated 22nd January, 1885.

952.—Alphonse Constant Reyrolle and Henri Louis Leconte, 53, Chancery Lane, London, for "An improvement in clocks and watches."—Dated 22nd January, 1885.

1,019.—Thomas Colson Rye, 53, Mile End Road, London, E., for "A 24 hour dial and frame, showing 12 hours (or figures) only, at one and the same time, from 1 to 12 the first half of day, replaced by figures 13 to 24 for second half of day."—Dated 24th January, 1885.

1,093.—James Simmons, 8, Quality Court, London, W.C., for "Improvements in or relating to watches and other time-keepers."—Dated 26th January, 1885.

1,099.—George Sprenger, 6, Thornton Place, Baker Street, W., London, for an improved shifting dial for watches and clocks."—Dated 26th January, 1885.

1135.—Christopher Stonehouse, "Town Time," Haltwhistle, Carlisle, for "An automatic duplex dial for watches, clocks, and time-pieces."—Dated 27th January, 1885.

1140.—David Kinnear Simpson, 6, Lord Street, Liverpool, for "Improvements in time indicators." (Complete Specification.)—Dated 27th January, 1885.

1191.—Frank Moss, 4 and 5, Arcade Chambers. Corporation Street, Birmingham, for "Improvements in watches."—Dated 28th January, 1885.

1231.—Henry Cousens and Emil Sundborg, 61, George Street, Portman Square, London, for "A self-acting dial showing the 24 hours."—Dated 28th January, 1885.

1236.—William Gabriel, 24, Southampton Buildings, London, W.C., for "Improvements in watches and clocks."—Dated 28th January, 1885.

1321.—James Batkin and Joseph Malins, Ferndell, Wilton Road, Sparkhill, near Birmingham, for "An Improvement in the construction of clock and watch dials for registering the hours from 1 to 24 hours."—Dated 30th January, 1885.

1344.—George Albert Bolton, 19, Sherborne Street, Islington, Middlesex, for "A new or improved method of indicating time in clocks and watches."—Dated 30th January, 1885.

1353.—Thomas Rowe Weston, 46, Lincoln's Inn Fields, London, W.C., for "A method of arranging the numerals 1 to 24 on the dial faces of clocks, watches, and other time-pieces."—Dated 30th January, 1885.

1439.—Augustus William Rixin and Richard Theiler, 10, Austinfriars, London, for "Improvements in electric clocks."—(Complete Specification.)—Dated 2nd February, 1885.

1531.—Eusebe Obrecht, 52, Chancery Lane, London, for "An improved arrangement of mechanism to enable both the old system and the new system of time to be indicated on one and the same dial of watches and clocks."—Dated 4th February, 1885.

1549.—Henry Martin Green, 70, Chancery Lane, W.C., for "An improved safety fastening for brooches."—(Complete Specification.)—Dated 4th February, 1385.

1570.—Frank Leslie Phillips, Norton House, 393, Moseley Road, Birmingham, for "Design for clock-watch dials, to indicate hours and minutes under the twenty-four chapter division."—Dated 5th February, 1885.

1624.—William Cooper Cooper, 24, Southampton Buildings, Chancery Lane, London, W.C., for "Improvements in clocks and watches and in dials for use in connection with the same."—Dated 5th February, 1885.

1757.—Constantin Dinichert, 9 and 10, Southampton Buildings, Holborn, London, W.C., for "Improved watch case."—Dated 9th February, 1885.

1933.—Henry East, 128, Colmore Row, Birmingham, for "Improvements in the dials of watches, clocks, and other time-keepers."—Dated 12th February, 1885.

1936.—George Hayes, Whittington, near Oswestry, Shropshire, for "The protection of watches, money, or other valuables, by a lock-up safety pocket."—Dated 12th February, 1885.

2012.—William Thomas, 41, Temple Street, Birmingham, Warwickshire, for "Improvements in the hands and dials of watches and other time-keepers, for denoting the two systems of time on one dial at a glance and without calculation."—13th February, 1885.

2030.—Edward Elijah Atkins, 7, Staple Inn, Middlesex, for "Improvements in the manufacture of steel studded jewellery, buckles, buttons and solitaires and other dress and hair fastenings and ornaments."—13th February, 1885.

2104.—Francis Taylor, 6, Lord Street, Liverpool, for "Improvements in clocks, watches, and other time-keepers with moveable dials."—16th February, 1885.

2109.—Jacob Adler, 1, Rue Laffitte, Paris, France, for "Improvement in watch-protectors."—(Complete Specification.)—16th February, 1885.

2112.—Frederick Mitchell, 39, Liverpool Road, Islington, N., for "Improved self-locking changing dial for 24 hour clocks."—16th February, 1885.

2222.—Thomas Wilcox, 6, Livery Street, Birmingham, for "Improvements in or additions to seals, charms, lockets, and other like pendent articles of jewellery."—18th February, 1885.

2279.—Alfred Wilcox, 8, Quality Court, Chancery Lane, London, for "A novel charm or appendage for watch and similar chains."—19th February, 1885.

2371.—Carl Hahlweg, 23, Southampton Buildings, Middlesex, for "Striking work with repetitition for clocks and other time-keepers."—(Complete Specification.)—21st February, 1885.

2384.—Thomas Barry, 8, Quality Court, Chancery Lane, London, for "Improvements in watches and other time-keepers, for denoting the 12 and 24 hour system of time."—21st February, 1885.

2509.—Hermann Aron, 33, Chancery Lane, London, for "Improvements in electric clocks."—24th February, 1885.

2512.—William Robert Lake, 45, Southampton Buildings, London, for "Improvements in time-pieces."—(*Hiram Washington Hayden*, United States.)—24th February, 1885.

2523.—Arthur Johnson Smith, Lincoln's Inn, Corporation Street, Birmingham, for "Improvements in solitaires and studs."—25th February, 1885.

2557.—Victor Ludwig Alexander Blumberg and Charles Nathaniel Blumberg, 11, Wellington Street, Strand, London, W.C., for "Improvements in clocks or time-keepers."—(*Monsieur Redier*, France.)—25th February, 1885.

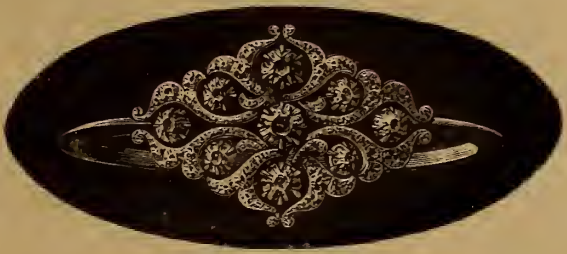
2659.—George Blackman and John Goss, 52, Chancery Lane, London, for "Improved construction of box or case principally intended to prevent the same being opened without detection."—27th February, 1885.

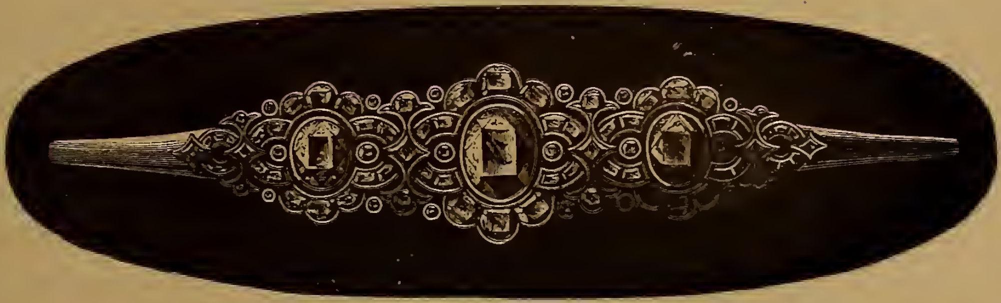
2690.—Seacome Mason, 48, Camden Passage, Islington, and Charles Rodney Huxley, 31, Cheldon Road, Fulham, S.W., for "Improving decayed vision and hearing by electro-magnetising the frames of spectacles."—28th February, 1885.

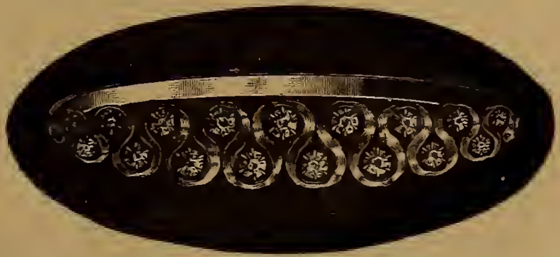
2727.—Louis Weill and Henry Harburg, 47, Lincoln's Inn Fields, London, for "An improvement in watches and other time-keepers."—(*Henri Guillaume Borel*, Switzerland.) 28th February, 1885.

Supplement to the Watchmaker, Jeweller, and Silversmith, March 5, 1885.

MONTHLY SUPPLEMENT OF DESIGNS.







THE WATCHMAKER JEWELLER AND SILVERSMITH

Entered at Stationers' Hall.] *All need the beautiful—Few can produce it.—GOETHE.* [Registered for Transmission Abroad.

No. 119.—Vol. X.] APRIL 6, 1885. [Subscription, 5s. per Annum. Post Free.

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ILLUSTRATED SUPPLEMENT:—"Designs for Modern Jewellery."

The International Inventions Exhibition.

THE opening of the Exhibition has been fixed for Monday, May the 4th, by his Royal Highness the Prince of Wales.

We are glad to be able to announce the fact that the American Watch Company are preparing to ship a line of machine tools to be exhibited in active operation at their stand in the Exhibition. An opportunity will thus be offered to English horologists of studying, and arriving at an accurate conclusion as to the relative *cost* of producing uniform work by *machine* and *hand* tools. They will also be able to see for themselves the degree of perfection that may be accomplished by machine tools, and also examine carefully the steps by which it is accomplished. Of course it is not possible for the company to exhibit the complete process of manufacturing an entire watch, to accomplish which Messrs. Robbins & Appleton would require a large portion of the entire building at South Kensington; but we shall be favoured with a view of a small model of their factory which is now being exhibited at New Orleans. The model is made to scale and cost 1500 dols. The greatest mechanics, statesmen, travellers, and savants of modern times have visited this factory, and a careful study of its contents seem only to have enhanced their exalted views of the manufacturing capabilities of the inhabitants of the United States. All are unanimous in their commendations. Thirty years ago America was one of our principal markets, now it is hopelessly lost; in fact, we are depending upon them for watches and clocks. Therefore, we must, without delay, inquire into the causes that lead to such results. Such an inquiry may not be palatable, but it must be beneficial, and there could scarcely be a more convenient season or more favourable opportunity to pursue this inquiry. Surely we shall add to existing reproach of wilful neglect. Some idea of the extent of the exhibit may be gathered from the fact that three spaces have been assigned to the company, of the following dimensions:—Work-bench, 36 feet by 15 feet; for model of the factory, 20 feet by 5 feet; and 30 feet by 10 feet for office and show-case. Considering that many of our countrymen have been denied even one square foot of space in which to exhibit inventions on which they have worked patiently for many years, the American Watch Company have been generously dealt with by the Commissioners on this most auspicious occasion. Without hinting at rivalry, it is to be hoped the English department will be well represented, and that our horological brethren from abroad will not only give, but also take valuable suggestions; for this commerce in thought, this trading in ideas, tends mutually to benefit exhibitors, and often produces good International relations that even the dispatches of Foreign Secretaries fail to effect.

THE direction in which a feather is drifting is generally sufficient to show "the way the winds blows," and the short speech of the President of the Board of Trade in the House of Commons on March 26th, which we publish, clearly indicates the lines upon which the new laws relating to Hall-marking will be framed. Owing to the great and momentous questions which now press so heavily upon the Legislature, and are shared, to some extent, by the country at large, another short lease is granted to existing laws for Hall-marking; we shall do well by occupying this interval in filling the lines Mr. Chamberlain mentions. While we are about it we may as well make a good law as a bad one; it costs no more and works infinitely better. The letters we have lately published on this subject have been laid before the Board of Trade and have no doubt received their share of attention.

Board of Trade.

WHITEHALL GARDENS, MARCH 11.

The Board of Trade have received, through the Secretary of State for Foreign Affairs, a copy of a despatch from Her Majesty's Legation at Berne, enclosing a decree of the Swiss Federal Council in regard to the control and warranty of manufactured articles of gold and silver. This decree provides that the standard designations marked at the Swiss Assay Offices on gold and silver work are to indicate in decimal fractions the degree of fineness of the metal as shown in the decree. For gold, however, there may be admitted the following carat marks:—

18 "karats," or 72-18k., for the standard 0·750.
14 "karats," or 56-14k., for the standard 0·583.

To facilitate the introduction in Switzerland of the decimal or millesimal marking, existing marks are also to be allowed until the 30th of June, 1885.

Copies of the marks may be seen at the Harbour Department of the Board of Trade on any weekday between the hours of 12 and 4.—*Times.*

VISIT TO THE CITY OF PRINCE ALBERT VICTOR OF WALES.—It was announced at the meeting of the General Purposes Committee of the Corporation, that his Royal Highness Prince Albert Victor of Wales would visit the City early in June to receive the freedom, which is to be presented in a specially-designed gold casket, for which the sum of £250 has been voted. Four of the principal goldsmiths and jewellers were invited to compete, and the committee selected the design of Mr. J. W. Benson, of Ludgate Hill and Old Bond Street, who also made the casket presented to his Royal Highness's father, the Prince of Wales, twenty-one years ago.

Adjusted Keyless Watches.

THE high-class English watch of the future will be distinguished, not by the watchmaker's name that is engraved upon the top place, or painted on the dial, no matter how great his reputation, but by the fact that it has been tested at the Kew Observatory and its performance has satisfied the requirements necessary for a certain order of merit, and therefore obtained a certificate to that effect. A leading article in the *Times*, of April 28th, 1884 (see also letters to the *Times*, April 22nd and December 26th, 1884) says: "Very properly the Kew Committee of the Royal Society has volunteered to arbitrate between watchmakers and the public. Any buyer of a watch will henceforth be able to ascertain the merits of his guide and monitor on evidence as infallible as that of the sun. Examinations are the natural doom of all creatures in this nineteenth century, and watches of elevated pretensions have no right to be exempt from the universal lot."

It is not my intention to trouble the authorities at Kew with suggestions, but I may here express the opinion that the present form of certificate is objectionable, and that it would be much more valuable and far less liable to deception, if it was accompanied by a punch mark on the top plate of the movement near to the maker's name, say a small circular punch bearing the words "Kew, '85," and in the centre "A.," "B.," or "C.," to denote the degree of perfection. For the want of a better term, which I cannot coin just now, I will call it Hall-marking the movement, and at the same time it might be made a distinctive mark of English work. Imagine the confusion, not to speak of the liability to fraud, that would arise if, instead of the present Hall mark given at Goldsmiths' Hall, a *certificate* was given to the effect that a certain gold case of such a number was 18 carats fine, and you will then have a fair idea of the confusion that will arise from the present form of certificate at Kew.

If the Royal Society find this new department unremunerative, and I hope they will find it unremunerative, they will doubtless be able to make it pay much better by charging about one half the present fees. The charge of one guinea for a certificate, class A, is about half the price that one of our best workmen receives for springing, timing, and adjusting the watch, in heat and cold, in the long and short arcs of vibration and six positions; in short, making the watch go as perfectly as possible; and it is manifestly unfair, and in the highest degree impolitic, to levy an exorbitant tax upon the skill of one man for a doubtful benefit on another.

At the present time if a first-rate workman in Clerkenwell makes two of the best watches that can be made, and one of them is engraved with the name of a well-known retail watchmaker of good repute, it will realise in the market just double the price of the other watch which is in every respect its equal excepting the name. This state of things is anomalous, and the sooner we get rid of it the better. Its worst effect is to deter a good workman from attempting high class work, whereas he ought to be encouraged in it. Or as Mr. Ruskin said in a lecture delivered at Manchester, on a much higher branch of art, "Your great men quarrel with you, and you revenge yourselves by starving them for the first half of their lives." The hope of regaining a share in the manufacture of medium class watch required by the million has long ago left the parish of Clerkenwell. "As railway companies know, third class numbers are required to pay for the maintenance of first class exclusiveness, Clerkenwell has discovered the truth negatively to its cost."[*] Yet a good trade may be done in adjusted watches, the demand for such work increases daily, and I propose to show the readiest way of making an adjusted watch with the utmost economy. Some of the cooperative stores in London have for years past made and sold large quantities of adjusted watches, and there are thousands of watch makers in this country quite as competent in such work as the co-operative stores. The first thing necessary to start with, is the movement, and as this is the foundation of the watch, and therefore a matter of some importance, I shall be excused for dwelling on it at some length. Having determined the size (the best selling size in the London market is a 14 size, open face crystal bissell, and a 12 size hunter for gentlemen, and a 6 size open face and 4 hunters for ladies), you must then be careful to secure a good calliper, *i.e.*, a movement in which all the parts are in due proportion, and so arranged as to operate correctly. Wheels and pinions must be correctly sized and in every respect true, and as near perfection as possible. All the polish in the world is not an equivalent for a defect of this kind. Neglect these precautions, and you will place the hope of obtaining a close adjustment very remote, but carefully study every part of the watch as you proceed with the manufacture of it, and then, the securing a close rate is not near so difficult as is generally represented. In short, it is a great pleasure to spring and adjust a thoroughly well-made movement, and you may waste an immense amount of time and skill by endeavouring to manipulate the pendulum spring, in order to overcome errors that lie in the *main spring train* and escapement.

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[*] *Times* article, April 28th, 1884.

The cheapest and best keyless movement in the market is that by Nicole and Co., Goswell Road, E.C. It is not all English work, part only is made in this country, and the remainder in Switzerland. The brass is that which is known in the trade as best hard-rolled dipping metal. The stamping out of the framework is done in Birmingham, and then sent to Switzerland to be operated upon by some very fine machine tools. The wheels and pinions (high numbers, and six barred wheels) are made at Prescot, in Lancashire, and then sent to Switzerland to be machine pivoted, the depths are run and they are as true and as correct as need be. The barrel is snailed and squared in a machine, and both stop-piece and winding wheel run perfectly true on any of the squares.

(To be continued.)

Superstitions concerning Precious Stones.

(Ancient and Modern.)

THE falling of an emerald from its setting has been held as an ill-omen to the wearer even in modern times. When George III. was crowned a large emerald fell from his diadem. America was lost during his reign. It is probable, however, that the fallen stone was picked up and reset in the crown,—an event not likely to happen in the case of the other gem. The emerald is said to have taught the secrets and knowledge of future events; it bestowed eloquence and increased wealth. This superstition suggested to Miss Landon, one of the most charming English poets, the following beautiful lines:—

> It is the gem which hath the power to show
> If plighted lovers keep their faith or no;
> If faithful, it is like the leaves of spring;
> If faithless, like those leaves when withering.
>
> Take back again your Emerald gem,
> There is no colour in the stone;
> It might have graced a diadem,
> But now its hue and light are gone—
>
> Take back your gift, and give me mine,
> The kiss that sealed our last loved vow;
> Ah, other lips have been on thine—
> My kiss is lost and sullied now.
>
> The gem is pale, the kiss forgot,
> And more than either you have changed:
> But my true love has altered not,
> My heart is broken, not estranged.

In the Talmud it is said that Noah had no other light in the Ark than that furnished by precious stones.

The City Companies.

Reprinted from *Chambers' Journal.*

SOME ponderous but interesting volumes have recently been issued in the shape of a series of blue-books containing the Report of the Royal Commission which, under the presidency of the Earl of Derby, has been inquiring into the manner in which the estates and funds of the various Guilds and Companies of the City of London are administered. All the world has heard of the great wealth of the City of London, a sight of the shops in which, even so far back as the commencement of the present century, caused a famous Prussian general to exclaim in the midst of his astonishment: "What a city this would be to plunder!" The revelations made, however, before the Commission are such as will put into the shade all speculative calculations of the wealth of the "great city." The capital of the Livery Companies of London is now known to be about twenty millions sterling, bringing in an income of seven hundred thousand pounds per annum! Owing to the increased value of houses and land, a great augmentation in the wealth of the Companies has taken place during the past ten or twelve years, in one case alone (the Drapers' Company) the increase reaching the handsome total of twenty thousand pounds in nine years.

The foundation of this vast fortune originated for the most part in charitable bequests, which have long since been diverted from the particular purpose which the donors had in view; and although the Companies have of late years given considerable sums for the promotion of technical education and other objects, yet the whole of such grants put together are an insignificant dole compared with the magnificent inheritance of which they are the custodians.

The Mercers' Company is the richest of them all, its income in 1880 being ninety thousand pounds per annum, which shows an increase in nine years (1871-80) of fifteen thousand pounds. In 1874 the Mercers spent in "court fees" over ten thousand pounds; but in 1880 only about nine thousand. In the management of their estates they spent in 1880 nearly eight thousand pounds, while salaries absorbed about six thousand. In "entertainments" they spent in 1880 five thousand pounds, as against seven thousand in 1874. Their charities, however, if they may be deemed so, including St. Paul's School, Mercers' School, the Whittington Almshouses, Trinity Hospital, Greenwich, and the grants they make in support of the Technical Institute and other London charities, amount to fifty thousand pounds per annum.

The Grocers had in 1879 upwards of forty thousand pounds a year, as against thirty thousand in 1870. They spend very little in court fees; and in salaries their expenditure in 1879 was three thousand six hundred and seventy-two pounds. In entertainments, &c., six thousand pounds were absorbed in 1879. They give away about twenty thousand pounds per annum for charitable purposes, and support, amongst other charities, the London Hospital.

The Drapers almost equal the Mercers with an income of about ninety thousand a year, as against seventy thousand in 1879. Of this large sum, "court fees and dinners" cost in 1879 some five thousand pounds; salaries, four thousand; public entertainments, six thousand; rates and taxes, &c., nearly four thousand; and "public works in Ireland," furniture, plate, &c., nearly thirteen thousand, as against fifteen thousand in 1875. They spend about forty thousand pounds per annum on their charitable trusts and other public objects; their chief trusts being Bancroft's Hospital, a middle-class school, Orphanages for Girls at Bow and Tottenham, and the Greencoat Hospital at Greenwich. Beside which, they support the Technical Institute and other charities in London.

The Fishmongers have an income of fifty thousand a year. Court fees, salaries, and office expenses are stated to be in the aggregate about seven thousand pounds; while entertainments, &c., come to about nine thousand three hundred. Repairs and improvements in their famous Hall amounted in 1877 to nearly thirty-eight thousand pounds. Amongst the Fishmongers' trusts are St. Peter's Hospital, Wandsworth, exhibitions at Oxford and Cambridge universities and the Technical Institute, to which, with donations to the London charities and to the poor-boxes in police-courts, they devote from twenty to twenty-five thousand pounds yearly.

The Goldsmiths come next with about sixty thousand a year. Their Hall cost them, between 1870 and 1879, about thirty-five thousand. Their court fees are about fifteen hundred pounds; entertainments, seven thousand; and they spend on good objects some thirty thousand pounds a year.

The Clothworkers have between fifty and sixty thousand pounds a year. Their court fees in 1880 were three thousand five hundred; salaries, three thousand; entertainments, nearly four thousand; and repairs and expenses, &c., about seven thousand. They spend on charitable objects, such as the relief of the blind, their schools at Sutton-Valence, the Technical Institute, the Technical College in Yorkshire, and the London charities, about thirty thousand a year.

It may be here explained that the "court fees" so freely mentioned in the above items of expenditure, are payments made to the members of the courts which govern the City Companies every time they attend business meetings. In fact, to use plain Ehglish, it is a division of a large part of the income of a Company among the members of the (so-called) executive body.

It will be seen that something like two hundred thousand pounds of their income is disposed of by the Companies in accordance with certain trusts; and the administration of these trusts will doubtless form the subject of another inquiry before thorough legislation can be attempted. Some of these trusts are in the shape of "doles," such as gifts of bread and fuel to the poor of certain parishes, loans to young men starting in business, portions to poor maids, &c.; but these objects absorb but a small portion of the immense fund in question, and which, if well and properly administered, would make a grand addition to the educational resources of the whole community.

To join a London Company costs a good deal; but the investment carries with it some wonderful privileges. For instance, it not only secures to the investor a life-long share in the dinners and entertainments of the Company, but in the case of a reverse of fortune, a room in a neat almshouse or a handsome pension. And strange to say, these benefits become hereditary, and are enjoyed by the investor's descendants, provided they choose to perform certain ceremonies. "Hereditation" is carried out to such an extent that the Companies have their hereditary poor, hereditary diners, clerks, surveyors, chaplains, &c., and even cooks and beadles. Salaries, expenses, and entertainments cost about two hundred and seventy-five thousand pounds a year; and the almspeople and pensioners about eighty or ninety thousand pounds.

The Companies claim that these immense incomes are all their own, and that they have, therefore, a perfect right to do with them as they think proper, even to the extent of dividing the spoil, as a certain legal community did a few years since. The government, however, think otherwise, and hence the appointment of the Commission whose report and recommendations we have before us.

The chief recommendation of the Commissioners is to apply to the City Companies the law of "restraint of alienation," which will place them under the control of the Treasury, and without whose permission they will be unable to convey land, sell out stock, or otherwise dispose of their property. The Commissioners also propose that, in future, the accounts of the annual expenditure of the Companies shall be published, in the same manner as municipal corporations and joint-stock companies, and even the universities of Oxford and Cambridge. This measure of reform will certainly be a very necessary one, for until the Report of the Commission was issued, no members of the City Companies, except the chosen few who form the "courts," had any idea as to what their respective guilds were worth, where their property was, or how they spent their money.

The fancy "Livery Franchise" is to be abolished, and there is to be a redistribution of the various revenues, and an allocation to objects of public utility of a considerable percentage of the immense sums already described. To carry this out, however, it is proposed to appoint a special Commission, with power to inspect and inquire into the title deeds, &c., of the various trusts, and to create new trusts in the place of those which have become obsolete. It is also proposed to put a fifty years' limit to the "hereditary" business, and that compensation should be given to all persons who may be injuriously affected by the carrying out of the Commissioners' proposals.

Thus a great reform is about to be instituted, which will at last enable the people of London to enjoy the benefits arising from a splendid inheritance, which is theirs by right, and which will be productive of great good in the future. When this change has been carried out, and the London Municipal Bill has passed into law, the inhabitants of the great city will be able to congratulate themselves on the fact that at last London has become in reality what it has long been in name only, namely, the finest and best-governed metropolis in the world.

Clocks in the West Riding.

THE West Riding of Yorkshire is specially notable for its clock, and for the affectionate way in which that clock is regarded by the peasantry. There are circumstances about the clocks we speak of, says the *Saturday Review*, that render them both sacred and remarkable, for they have ticked through many a well-remembered hour of happiness or of pain—through a century or more, indeed—and they are, besides, the work of skilled mechanicians, who established a well-marked local industry, that died out within easy memory. So it happens that clocks are regarded in West Yorkshire with a warm affection, and that their owners feel a pang in parting with them, as they would at the drawing of a tooth or the excision of a nail. The local manufacture flourished in a period that may roughly be measured by the long reign of George III. At that time almost every village had its clockmaker, who was a man possessing both scientific knowledge and technical skill, and who for these reasons came to be highly esteemed in his district, and was referred to as an authority in matters beyond the ken of most people. Then he was an artist, too, a man trained in the chasing of metal—and very well he did it—for he had brass faces of clocks to adorn and other work to do for the gratification of exacting patrons. It is true that the making of clocks was often departmental, and was given out to men skilled in its several branches; but still the clockworkers were men of no small knowledge and technical power. If a father wanted to make a wedding present to a younger son, he very often endowed him with a clock, since he could not inherit the ancestral one. Then the visit to the clockmaker would be an important matter, and there would be weighty questions to settle. Should it be an eight-days clock? Yes, certainly; that was not difficult to decide upon. But what kind of face should it have; should it be of brass, with a silvered dial, and should it have ormolu mountings, or be chased to the utmost of the maker's skill? Then the tone of the bell must be considered, and whether the hammer should be faced with horn or bone, or with a bit of hard oak, or only with a softer wood; for the metal hammer was rarely allowed to strike the bell. Finally, came the question of the case, and here other aid was called in. It required a trained eye and a nice sense of proportion to design a case that would exactly be appropriate for the clock. The case maker was a skilled carpenter, one who could cut beautiful and accurate mouldings, and who understood panelling and inlay; and he must have a knowledge of architecture too. The clockmaker would supply him with Queen Anne balls of metal for the top, or with Corinthian or Ionic caps and bases in brass for his pillars, if he needed them, and with mountings for the door also; but it would be for the maker of the case to prescribe the appropriate design, to advise as to the kind of wood to be used; whether it should be oak—to which he had a very strong leaning—or mahogany, or walnut; and he might be called upon for elaborate inlays, or even for carved panels of different woods. The clockmaker's scientific knowledge lay much in the direction of astronomy, for there he was chiefly called upon to exercise it. The majority of the works produced in the West Riding in the palmy days of the art have a black disc, affixed by its centre, as a pivot, at the top of the brass face, behind which it makes a semi-revolution during a lunar month. Half of this disc, which itself is as large as the clock-dial, appears above the face, and has painted upon it a moon the size of a large orange, and a number of stars in silver. The young moon rises on the left from behind a black semi-circle of its own diameter, and slowly increases day by day until it reaches the full and appears as a silver circle upon a black, star-sprinkled background; then it descends on the right behind a similar black semi-circle, and just as it is lost to view another moon on the second half of the black disc begins to show itself on the left. The age of the moon may be learned from figures cut on a brass rim which surrounds the lunar semi-circle. This astronomical arrangement was made by Batty, Jackson, Lister, and others. Some clocks, differing from these, have a small round aperture in the face itself, behind which a silver moon shows itself as the month goes on. One so designed was a wedding present in the first half of the last century, and the first possessor has written his own name, with that of his bride, inside the case-door. This clock was made by Richard Midgley, and has the motto *Dum spectas fugio* on the dial. The defect of the lunar arrangement described, is that the moon never appears gibbous but is always in its phases, a circle with a crescent-shaped piece cut out of it. This circumstance led some mechanicans, among whom was one John Bothomley, to make the moon globular, one hemisphere being silver and the other black, and it was placed in an ornamental semi-circle above the face and revolved within a bevelled recess. Thus the actual appearance of the changing moon was produced; but clocks of this kind are rare, and we have seen only four or five. The clock-face, which supported this lunary orrery, was of brass, and the dial circle, which had the hours beautifully engraved upon it and coloured black, was of silver. The white-painted faces which are often seen on "grandfathers' clocks," are altogether later or more degenerate productions. The clock-hands were frequently of wrought iron in elegant designs, and below them was an arrangement for showing the day of the month, produced by a circular plate turning behind the face. The case was a beautiful piece of carpenter's work. The "head," which enclosed the works, had usually Ionic or Corinthian pillars or pilasters, at each side, supporting the top, which was of Queen Anne design, and often terminated with three brass balls. The "body" of the clock was narrow, sometimes so narrow that there were apertures at the sides to admit of the swing of the pendulum, and it was connected with the head by a number of mouldings. In some cases the clock door had a bevelled glass panel in it, to admit of the large brass pendulum bob being seen. The base of the clock was again broad and massive, and supported the whole structure with becoming dignity.—*The Globe.*

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The failure is announced of the firm of A. Leroy and Co., jewellers, 53, Galerie Montpensier, in the Palais-Royal, with liabilities said to amount to from 700,000 fr. to 800,000 fr. The house was known to have been in difficulties for some time past. We may mention that the Leroy and Co. in question is in no way connected with the celebrated firm of Le Roy fils, formerly Court watchmakers and jewellers at Nos. 13 and 15, in the same Gallery of the Palais-Royal.

Foreign and Colonial Items.

By A. Fischer.

In the present age of competition we think we can do no better service to the manufacturers than by calling attention to new sources of demand, and by giving such hints as may prove useful to them in extending their connection. In previous articles we have already given particulars of the special requirements and markets beyond the sea, and we intend to supply similar information from time to time. We take every precaution that informations given shall be of a reliable nature, and have for this purpose put ourselves in communication with correspondents of standing.

A market which might be very profitably exploited, and certainly deserves more attention than hitherto received, is Madrid. Up to the present French manufacturers have had almost a monopoly of the jewellery trade in that city. Birmingham manufacturers only require proper and systematic introduction to secure a share of the business. There is a certain amount of home production in Spain, but beyond special local requirements Spanish manufacturers are not in a position to compete. Current goods, at moderate prices, are particularly in demand. The easiest way of securing a footing in the Spanish market would be to enter into negotiations with some of the leading jewellery houses in Madrid; their names are as follows:

Antonio Martinez.
Celestino Ansorena.
Carlos Martinez.
Francisco Martinez.
Marabini.
Penalver.
Espunez.
Sellan.
Mellerie.

Reports from Amsterdam state that there is no better tone in the diamond market. Orders are very limited, and prices low.

The same may be said as regards Paris. Business is more promising, but sales are still unimportant. The failure of a large firm of diamond merchants has injuriously affected the Paris market.

Two new companies have been formed in Paris during the past month for the exportation of jewellery, bronzes, &c. They are, Desprez et Hucket, 17, rue de l'Echiquier, and Meiffre & Co., 3, Cité Magenta, each with a capital of £48,000 each.

We hear from Porto Rico, that there is a good demand for showy necklets at the price from £10 to £15. Negresses principally esteem the *boule* and *rococo* style. The Spanish Creoles, like North American ladies, are very partial to diamonds, which are said to be sold at double the European prices.

The latest novelty in American bracelets is in the shape of little books in silver and gold, decorated with coloured enamels, and bearing the names of celebrated poets. It is sold under the name of the "literary" bracelet.

Mr. Jacques Hug, a watch-case manufacturer, of Locle (Switzerland), has just been arrested for fraudulent manufacture. He managed to impart a good deal of brass to his gold cases in such a manner as to deceive the best connoisseurs, including the Bureau of Control. Suspicions were aroused by the low prices at which he supplied these cases, and the fraud was discovered by a competitor.

The committee in charge of the National Rifle Match to be held this year in Berne, has decided to give a number of high class gold watches as prizes, in lieu of the traditional cups. A good gold watch is certainly preferable and more useful than a cup of ordinary design.

In our last, we reported an extensive jewellery robbery at the establishment of Mr. Gabriel Levy, Paris, and up to the present the police does not seem to have been able to get hold of the thieves. The Parisian papers are kind enough to attribute the robbery to a band of London burglars. Parisians probably think that because we have the best safe makers of the world in England, we have also the most expert safe breakers.

News from Chaux de Fonds are a little more cheerful, owing to the visits of foreign buyers. It is stated that the purchases were not important, but that some good orders have been placed.

A committee has been formed in Locle for the purpose of erecting some national monument in honour of Daniel Jean Richard, the founder of the watch industry in the Swiss Jura, who died in 1741. Richard has certainly laid the foundation for the wealth and prosperity which the Canton of Neuchâtel at present enjoys, and it seems strange that such a benefactor should have had so long to wait for a just tribute to his merit. It does not, however, become us to upbraid the Swiss for this neglect, considering how badly we have treated our own celebrated watchmakers. The tomb of Harrison has only recently been saved from destruction and oblivion.

A Swiss paper, speaking about introduction of new industries, mentions the fact that there is not a single clock factory in Switzerland. It is estimated about a million francs are sent out of the country annually for clocks.

Mr. Gautier, the Rector of the Geneva Observatory, has just presented his annual report on the chronometer trials for the past year. To the *Journal de Genève* he rendered the following particulars:—"529 watches were sent to the Observatory; 112 of them received bulletins marked *very satisfactory*. The mean rate of these 112 timekeepers from one day to another was 0,"408 against 0,"425 in the previous year; the variation by change of position 1,"58 against 1,"653 in 1883; the variation per degree of thermometer 0,"112, same as in 1883. The trials lasted 45 days divided in 8 periods of 5 days, with four intermediary days, which are not reckoned. To obtain a *very satisfactory* bulletin, it is necessary that the variation from one day to the other, should not exceed three-quarters of a second; nor $2\frac{1}{2}$ seconds in the rate in various positions; nor $\frac{2}{10}$ compensation error. The *good marks* are calculated in such a manner that an *absolutely perfect* watch would have 300 points, and one having 0 would still obtain a *very satisfactory* bulletin. The chronometer which ranked first in last year's trials comes close to the famous watch of Mr. Alexis Favre which in 1881 excited the admiration of all competent men, and which obtained the extraordinary number of 232 marks. The champion chronometer of 1884, has 230·6 points, and is the production of a firm which has not given its name; and was adjusted by M. Marius Favre, Fils. The trial figures were 0,"28, 0,"51, and 0,"042 respectively. In 1881 the chronometer which ranked immediately after Mr. Favre's scored 185.8 points, while last year there were no less than 11 exceeding that number. Twenty-five different firms took part in the trial, but only eight of them sent in five or more chronometers. The honours of the day were carried off by Messrs. Patek, Philippe & Co., the mean number of marks for the five best chronometers being 184.94 against 182 in last year.

To give a striking idea of the degree of perfection now attained in the adjustment of chronometers, the Director of the Observatory gave the following details: A watch which beats five times a second, makes 432,000 beats a day. The requirements of the trials are such that if the chronometer beats 432,004 or 431,996 times a day, and that during a period of 45 days, it would be excluded from competition. In the prize chronometers there is a mean rate of about two seconds, that is, in 24 hours they beat at the most 432,001, or at least 431,999 times. The watchmakers at Geneva have every reason to be proud of their abilities.

Jewellery:

ITS HISTORY AND MANUFACTURE PRACTICALLY TREATED AND ILLUSTRATED.

(*Continued from page 134.*)

THE events that preceded the reign of Aahmes I., or Amosis, are, indeed, only imperfectly known, but the following seems the most probable explanation of the history of that remote period.

"At the close of the Sixteenth, or Shepherd Dynasty of the Hykshos, Apapi-as, one of the last monarchs of the line, commanded the Egyptian king, who, at the time, only ruled over the South, to supply him with workmen and materials for the construction of the temple of the god Seth, at Tanis or Avaris. This and other demands appear to have been indignantly refused, and a war broke out in consequence between the Egyptians of Southern and the Shepherds of Northern Egypt.

"Some of the events of the period are detailed on the tomb of the naval officer Aahmes-Pannebeu, at El-Kab, or the ancient Eileithyia.

"His father was named Bakhi, he himself was born in the fortress of Nebeu or El-Kab, and succeeded, in place of his father, to the command of the ship-of-war named Mas, or "The Calf," part of the Northern flotilla.

"He followed the monarch's chariot on foot in his Northern campaigns, serving, as most Egyptians, either on sea or land.

"Aahmes-Pannebeu was subsequently present at the siege of Avaris, the great fortress of the Shepherds on the Tanaitic branch of the Nile, by which alone they now held military possession of Northern Egypt.

"Subsequently he fought in the fleet in the canal, or arm of the river called Pagetku—probably the Tanaitic branch of the Nile—and killed one of the enemy, whose hand he brought in triumph to the camp, and received a golden armlet for his prowess and courage.

"In a second attack, made on the southern side of this fortress, he killed another of the Shepherd race, for which he received a similar reward. Subsequently he took a third prisoner at the same place; and, at the final storming of Avaris, he captured a male and a female prisoner, whom the King gave him for slaves, and rewarded him with another gold bracelet. This officer had seven times received this remuneration or decoration for his services.

"The other rewards which this naval officer had received were of the same kind as those found on the mummy of the Queen, consisting of bracelets, collars, armlets, a crown of gold inlaid with stones, daggers with handles fashioned in the shape of lions' heads, and hatchets, many of which were of gold.

"These objects were, in fact, the donatives of the king for military valour, and were given as crosses and medals are at the present day, gold chains and medals under the Tudors and Commonwealth, or crowns, chains, torcs of gold, and phaleræ or trappings by the Romans to their legionaries. Such relics, it may readily be conceived, were often deposited with the dead; and weapons, tools, and other objects of remote antiquity are constantly found either in the tombs or upon the mummies.

"During the early dynasties, as late as the Eleventh, it was the custom to depict inside the rectangular coffin of military and other officers, the weapons and wardrobe of the deceased, with an inventory of the number they possessed, or which were supposed to be placed in the sepulchre. The interest of these objects is that they are contemporary with the expulsion of the Shepherds, about B.C. 1800, and may have been borne by the monarch Aahmes in his campaigns against the Hykshos, as emblems of his royal dignity, and subsequently deposited with the revered remains of his mother in the tombs of Gournah, as marks of filial piety.

"Some obscurity, indeed, prevailed in regard to the place occupied by the Queen Aah-hept in the Eighteenth Dynasty, previous to the discovery of her coffin.

"She was probably called after a monarch of the same name, who appears amongst a group of kings of the Seventeenth Dynasty in the tomb at Gournah; and the Queen herself is represented on the cover of a coffin in the Museum at Turin, wearing on her head a vulture-shaped attire surmounted by a tiara of uræi, serpents, placed after Amenophis I. and his mother Aahmes-ari-nefer.

"The objects themselves are remarkable for the beauty of their fabric, and comprise specimens of inlaid work which rival the best productions of the goldsmiths of ancient Greece. They are incrusted in a kind of cloisonné mosaic of opaque glass of blue and red colour, and not enamelled,—this latter class of work not being known prior to the Roman Empire, and appearing only in the gold works found in the pyramids of Meroe—Æthiopian monuments, certainly of a time not so remote. The gold of which they were made probably came from the Æthiopian mines, while the vitreous pastes with which they are incrusted were the products of the furnaces of Thebes. These pastes do not form an enamel by having been applied to the metal when heated, and therefore adhering to it, but are of the kind of work called by the Greeks "loreutic," or inlaid; the paste and other substances employed being cut into the required forms and inserted into the cells of goldwork in which they were disposed. The principal substances used for this purpose by the Egyptians were lapis lazuli, root of emerald or green felspar, jasper, obsidian, and opaque glasses imitating them and the delicate blue of the turquoise. The true enamelling does not appear to be older than the Roman Empire; and although real enamels have been discovered by Ferlini in the remains found in the Pyramids of Meroe, the date of these monuments fs generally admitted to be of the Ptolemaic and Roman dominion in Egypt.'

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Immense Robbery of Jewellery.—The shop of M. Gabriel, a jeweller, of No. 2, Avenue de l'Opera, was recently robbed by burglars of jewellery of the estimated value of 800,000 francs. Most of the objects stolen, which consisted of rings, bracelets, and necklaces, were kept in a strong iron chest, which the thieves broke open. The shop itself was entered by false keys, and by the entrance on the Boulevard. It is evident that the thieves were persons familiar with the premises.

Jet-Mining at Whitby.—Jet-mining is a hazardous occupation, but accidents, fatal or other, have, perhaps, been fewer than might have been expected, considering the perilous nature of the work. At one time over twenty jet-mines were being worked, needing the labour of from two hundred to three hundred men; but owing to various causes, notably the introduction of Spanish jet, there is a falling off in the quantity of jet extracted from the cliffs and hills of the Whitby district. The Spanish jet—in the rough state, of course—is brought to Whitby and sold in large or small quantities, to suit the purchaser, who may be some poor man, working in his own garret on his own account, or some comparatively rich man, with large, light workshops, the latest improvements in such machinery, and workmen at his command in numbers to suit the business he may be doing. Of late years fortune or fashion has caused considerable fluctuation in trade, and the distress amongst the poorer jet workers has often been very great.—*Good Words.*

Gilding without a Battery.

Repairers of jewellery, particularly those residing in the country, know the necessity there is for a preparation which would enable them to gild their jobs in an expeditious and inexpensive manner. Under present circumstances, repairs requiring gilding have to be sent to some centre of jewellery manufacture, thus entailing a considerable loss of time and money. Many country jewellers are, of course, quite conversant with gilding and silvering, and are in possession of batteries, but unless a considerable quantity of goods has to be treated, the preparation of a bath is too expensive. Let us suppose, for instance, that a brooch has been repaired, and that some soldering had to be done. Now to make a decent job of it, the repaired part must be gilt in the same colour as the article, but everybody knows that this cannot be done with the present means at command without considerable labour. From time to time there have been gold solutions brought into the market, but they all have failed to answer. To supply the repairer's want, it is absolutely necessary that the preparation should be simple in its use, capable of producing a gilding of any desired colour, and perfectly adherent. Those who have used the solutions hitherto offered, know very well that satisfactory colour and adherence are not obtainable from them. The fault lies in the fact that the manufacturers have always thought it necessary that the gilding preparation should be ready mixed in a bottle, being thus practically nothing else than a bottled gold bath. This would be very well if the bottle were used in a short time. Every electro metallurgist knows that a gold bath deteriorates with time, hence these solutions failed to give anything like satisfactory results after a certain period.

This is a question that has for a long time occupied the attention of Mr. A. Fischer, and after some years of experiments, together with competent metallurgists, he is now enabled to give to the trade a gilding preparation which will satisfy every claim.

Mr. A. Fischer's Aurogentine is in two bottles, No. 1 contains the gold powder, and No. 2 the dissolving liquid, thus the smallest quantity can be immediately prepared by mixing the two in such proportions as the full and most complete instructions accompanying the bottles give. After the gold mixture has been prepared, a small quantity may be treated in a watch glass, all that is necesssary is to expose it to a spirit flame, stirring at the same time with a piece of sharpened wood to assist the dissolution of the ingredients. The solution is then ready for use. It may be applied to the part of the article to be gilt with the same piece of wood, and the article heated over a spirit flame, and then polished. The amount of solution, and the degree of heat applied, determine the colour of the gilding. If the instructions given with the bottles are strictly followed, only very little practice is necessary to be able to produce any colour of gilding at will.

As by this process of gilding an interchange of metal takes place, the adherence is perfect, and the coating could not be removed without some of the metal of the article gilt.

If a number of new and larger articles have to be gilt, a bath can be prepared by dissolving some of the contents of bottle No. 1 in distilled or filtrated rain water. The solution is slightly heated before use. A piece of zinc (which accompanies each dose) is brought in contact with the articles to effect the chemical reaction.

Gems and precious stones are not affected at all in gilding with either method.

In all cases the articles operated upon should be thoroughly cleaned by the well known methods.

Fischer's Aurogentine is at the same time most economical. It is sold in bottles, 10s. 6d. and 20s.

To give an idea of what may be done with a 20s. parcel, we may state that it will be sufficient to obtain about a quart of good solution, which will allow the gilding of a great number of jobs.

Gem-Cutting.

ABOUT the same time that the Italians began to make artistic medallions the sister branches of intaglio in gems and the cutting of cameos were revived. The art of intaglio was equally a resuscitation of Greek and Roman art, but also a more direct heritage of the Tuscans from the Etruscan scarabei, which were incised with mystic signs before Greek art was imported into Etruria, or Rome was founded. Yet, though the amulet or scarab appertained to the religion of almost all the primitive nations—Babylon, Troy, Egypt, Etruria, &c.—the Greeks were the perfecters of the intaglio, and it was only when their style influenced the Etruscans that the scarab became a work of art as well as a mystic object of reverence.

The finest intagli of the Roman imperial period were by Greek artists resident in Rome, such as Hyllus, Apollodorus, Gnaeus (or Cneius), Aulus, &c., who were worthy followers of the still more ancient intagliatori of Greece—Dioscorides, Polycrates, Scylax, &c., whose works, incorruptible by time, have been preserved to us, and are now scattered through European museums. Like all other arts intaglio decayed in Byzantium, yet was never so extinct but that traces of it are to be found even in dark ages. There are rude Christian intagli of early date. Those of the first few centuries have only emblems on them. Gori gives an engraving of two Christian rings in the Museo Vittario, Rome, on which the monogram of Christ and the emblems of martyrdom are incised. Another has a dove, a star, and the monogram. King speaks of a plasma on which a head of Christ was cut in cameo.

The Gnostic gems date earlier, about the third or fourth centuries after Christ. The Gnostics were heretics, whose worship abounded in mysticism, and their amulets, cut rudely in sardonyx, carnelian, or other ordinary stones, bear intagli of their allegoric deities, Abraxas and Jao. The Byzantine gems, dating about the ninth or tenth centuries, consist of huge cameos of Christian subjects, as remarkable for the stiff coarseness of workmanship as for the rarity and costliness of the stones. The cutting of dies for seals was in vogue in Florence in the early days of the Republic. Giulianelli mentions two seals used by the Signoria before 1300, one with Hercules on it, inscribed "Sigillum Florentinorum," and the other with the giglio (lily) and the motto, "Sigillum Priorum."

The earliest artistic Florentine gem engraver was the Maestro Benedetto Peruzzi, who, in 1379, was living in exile at Padua. In the white stratum of a sardonyx he cut a cameo of a dead Christ in the arms of an angel with a long tunic. The drawing, though not very correct, is in the Florentine fourteenth-century style.

There exists in the cameo-room of the Uffizi a splendid onyx of three strata, with a cameo on each part—a Nativity on one side and an Adoration on the other. It is by Puccini, and is said to date from about A.D. 1400.

The moving spirit of the revival of classic intagli in the fifteenth century was certainly Lorenzo de' Medici. Among the numberless antiquities found daily in Rome, in that age of passionate seeking for relics of ancient books, either of art or literature, nothing more delighted the taste of Lorenzo than the cameo and the incised gem. It was a taste he shared with his uncle, Giovanni, the younger son of Casimo Pater Patriæ, who had employed Ghiberti to make an exquisite golden setting for an antique intaglio of Apollo and Marsyas.

So enthusiastic was Lorenzo on the subject that he invited artists from other cities, where the art was already beginning to revive; and, advising several of his artistic protégés to dedicate themselves entirely to intagli, he gave them a studio in his own house, lending his precious antiques as copies, and supplying them with ideas as well as material for new ones. The gems made there were generally inscribed with his name, "*Lawr. Med.*" There is a fine specimen so signed in the British Museum. The subject is a lion passant, in low relief on the red layer of a sardonyx. Several of the gems in the Florentine Dactyliotheca in the Uffizi were of this collection. The artist who best repaid the care of Lorenzo was a certain Giovanni, who became so expert that he is known to us by no other name than Giovanni delle Corniole (John of the Carnelians). The gem room of the Uffizi contains two very beautiful specimens of his work,—one a likeness of Savonarola, intaglio on carnelian, inscribed "Hieronymus Ferrariensis ord praed propheta—vir et martyr." It was executed after his death in 1498. The other is a noble matron with a veil, on blood jasper, said to be Lucretia Tornabuoni, the mother of Lorenzo de' Medici. There is a cameo likeness of Savonarola on *niccolo* in the Kircherian Museum at Rome, dated 1498, which may possibly be Giovanni's work. Giovanni's nearest competitor in the Medici studio was Domenico (Compagni) de' Cammei, who was as good a master of intaglio in relief as his friend was of intaglio in *incavo* (or cut in). By him are the two splendid intagli in the Uffizi—that of Lorenzo de' Medici, in a toga, on onyx, and that of Lodovico Storza il' Maro, an armed bust cut in a ruby balois, or lightning ruby, of a very large size.

In these first masters there is still the Florentine realistic love of nature; but a younger contemporary, Pier Maria, of Pescia, who lived in Rome whilst Raphael was searching for antiques, and, like all his fellows, gave himself up to the study of ancient art, produced some gems of exquisite finish. The Florentine Gallery has a group in porphyry representing Venus and Dove, by Pier Maria. His name is written in Greek letters on a pedestal near which the figures stand. By this time nearly every art centre had its intagliatori. At Bologna, were Matteo di Benedetto, Marco Azio Moretti, and Francia—who, in his universality of talent, tried also the cutting of gems; Rome had its Caradosso, Severo da Ravenua, Niccolò Avanzo—by whom a lapis-lazuli cameo of the Nativity, with many figures was done. There were Giovanni Maria, at Mantua; Luigi Nichini, or Anichini, of Ferrara; and the Genoese Jacopo Tagliacarne.

All these prepared the way for the still greater excellences of Giovanni Bernardi, of Castel Bolognese, whom we have already mentioned as a medallist. His youth was spent in the service of Alfonso, Duke of Ferrara, for whom he engraved a crowded and spirited battle-scene on rock crystal. Paolo Gionio induced him to go to Rome, where he obtained the patronage not only of the Cardinals Ippolito de' Medici, and Giovanni Salviati, but of the Pope Clement VII. himself, for whom he made several dies for the finest pontifical coins. So artistic were they that the emulation of that fierce soul, Benvenuto Cellini, was aroused, and he for some days forgot everything in his eagerness to make a still finer medal.

After the Pope's death, the Emperor Charles V. would have taken Bernardi to Spain, but he was too loyal to his patron, Cardinal de' Medici, and refused to leave Rome. On the death of that prelate, in 1535, he entered the service of Cardinal Farnese, for whom he executed the crystal cross, and the two silver candelabra, decorated with six intagli on rock crystal, which the Cardinal presented to the Church of San Pietro. Besides the group of the Crucifixion, the base of the crucifix has three intagli of scenes from the Passion. The six crystals in the candelabra are engraved with subjects from the life of Christ, in which, good artist as he was, Bernardi did not disdain to accept another artist's designs, as the "Resurrection of Lazarus" is from a drawing by Pierino del Vaga. The same painter also gave him designs for the classic intagli with which Mariano, the Florentine goldsmith, adorned a rich silver casket for Cardinal Farnese. The subjects were the "Chase of Meleager," "Bacchus returning from India," the "Battle of the Amazons," and "A Bacchanalian scene;" from which latter, it is said, Carracci took his composition of the Triumphs of Bacchus and Ariadne.

A still greater master gave designs for Bernardi to engrave—Michelangelo, who drew the "Tityus and the Vulture," and the "Fall of Phaeton" for him. The first was engraved in crystal for Cardinal Medici, the latter for a friend of Michelangelo's, Cavaliere Tommaso. The sketch of fhe "Phaeton" was in the possession of Signor Mariette, author of the "Trattato delle Pietre Intagliate." On it was written in Michelangelo's hand, "Signor Tomaio sequesto scizzo non vi piace ditelo a Urbino affinche io havvi tempo di haverne facto un altro come vi promessi, e se vi piace e vogliate che io lo finisca, ancora ditelo"—Signor Tommaso if this sketch does not please you, tell Urbino [servant of Michelangelo], that I may have time to make another, as I promised. If you like it, say so.

Later in life, Bernardi retired to Faenza, where he built a handsome house, and furnished it with beautiful pictures, among which he boasted Titian's "Ages of Man." He died here at Easter, 1555.

(To be continued.)

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Watch Lore.

"FINE time-keeping," recently remarked a well-known up-town jeweller, "is not confined exclusively to the higher-priced style of watches. Many of the cheap movements rival their more costly competitors in the matter of reliability. Few men care for very accurate timepieces. With the exception of railway engineers, upon whose punctuality often depends the lives of hundreds, a watch which records the time within a minute a week is as valuable as any other. In 1876 a cheap grade of nickel-cased watches were made, which at once became very popular. The works were made of brass, with as little money spent on finish as possible—only the parts requiring polish received it. They were sold from $6 to $12, and, like new newspapers, they filled a want long felt. Since then the manufacture of these watches has increased a thousand fold, and now no timepiece finds a readier sale."

The jeweller fished out of a dazzling array of timekeepers a few of the most valuable ones. One was encased in a gold shell with the crystal set flush with the rim. It was about the shape and as smooth as a thin polished biscuit. This timepiece was a split-second chronograph or horse-timing watch. Around the dial there were sixty figures instead of twelve, one for each second. These were all sub-divided into four divisions by delicate hair-line marks. Upon the pressure of a convenient spring in the rim of the watch, the one hand is instantly divided into two hands, one of which pursued the circular journey alone, while the other remained to record the distance already gone over. Another touch upon a similar spring, stopped the hand, and still another pressure, and the two hands instantly re-united and flew back to their original place on the dial. The hour and minute of the day were recorded by a brace of hands on a sunken dial about the size of a dime at the right of the centre of the large dial, and a stubby hand told off the seconds on a similar dial at the left. This watch was valued at $600, and contained many, but by no means all the latest inventions in watchmaking. There was another watch in a case of a far more elaborate pattern, fabricated out of a rich copper-alloy gold, and highly polished. Its rim was corrugated with knobs and springs. This was not only a chronograph, but a repeater as well. Near the hinges was a small slide. When this was moved, there followed a low buzzing sound like a distant swarm of bees, and a deep-toned silver bell struck the hour, while a smaller one rang out the minutes. At night this is a valuable feature, and often saves many fruitless and profane searches, over unexpected and unheard of obstructions; for matches, which are never where they ought to be, and for gas fixtures which have invariably and mysteriously shifted their places after the light has been extinguished.

Another watch had, in addition to the chronographic and repeating attachments, a perpetual calendar. This was the gem of the collection, and was worth 1,200 dollars. It had split second hands, but the hour and minute hand travelled the same course as in an ordinary timepiece. There were three little sunken dials below the centre of the large dial. In one a short second hand pointed out the day of the week, which was indicated in small red letters. In another was told the month, and in the remaining one the day of the month was denoted. Directly under the figure "12" was a crescent-shaped dial with a black background, in which rose and set a golden moon. By this watch the phases of the moon, the time of the day, the day of the week and month, and the name of the month were all told, leaving the fortunate owner only the year of our Lord to remember. In addition to these horological and astronomical accomplishments, the bells struck the quarters of the hour as well as the minutes, by a combination of the two bells making an embryo chime. The tone of these silver bells was so sweet, that an appreciative owner might at first be tempted to lie awake half the night to hear them strike. There were a vast variety of other fine watches, telling everything that a man should have any right to expect from one single timepiece, and ranging in prices from $200 to $1,200.

"These," resumed the jeweller, "are all made by our firm, at our Swiss factory, and rival the most celebrated works of the European makers. The calendar watches have such complicated machinery that they are very liable to disorder. Extreme care must be taken with them, as there are probably not a dozen men in this city who could repair one when it needs a watchmaker's attention."

The cases of some of the watches shown were of fanciful designs. One was of red gold with a dull finish, and made to perfectly represent alligator leather. Another was of yellow, hammered gold, equally as rich as the former, but not as durable. One of the most curious patterns was a racing scene. The figures were done in gold and platinum and riveted to the case, where they stood out in bas-relief. The crown of the stem was a golden jockey's cap. As might have been imagined, this was a horse-timing watch. A very handsome one was made of small gold and platinum squares like a checker board. The blocks were of the same metal clear through and were welded together.

"The watches having the greatest reputation," continued the jeweller, "are made in England and Denmark, but our own American makers and some Swiss watches are equally as reliable timekeepers. Watchmaking is not a secret art, and the names of good watchmakers are legion. Some of the foreign jewellers are shrewd advertisers. They often leave some of their better grade of watches in the great astronomical observatories to be regulated by the planets, as it were. The attendant who winds them daily and records their variations is not a jeweller, and understands nothing whatever about timepieces. After leaving them there for several months, their records are sent with the watches back to their owners. This trial is supposed by some persons to lend an additional value to the watches, but in reality it does nothing of the sort, for the variations of a watch which is kept in a cool room in a perfectly stationary position is not at all similar to the record the same movement will make in a gentleman's waistcoat pocket. A man doesn't buy a watch to hang it up like a clock. It must, therefore, be regulated for his use personally. A watch which would accurately record the time for a bank president would be little good for a railroad conductor until it had been regulated to suit its new ownership.

"'What is the finest time I ever knew a watch to keep? We sold ex-Corporation Counsel William C. Whitney a watch which ran from one December until the next May—five months—and only varied seven seconds during the entire time. Our ordinary fine watches are only guaranteed to keep time within a second a day."—*New York Graphic.*

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Queries and Replies.

IN our last issue we replied to our correspondent, J. A. GOURLAY, on the demagnetisation of watches, we should also have referred him to an able article on this subject in Vol. V. of this journal.

Out and About.

They say that a watchmaker belongs to the "sell-tick" race.

I cannot help thinking so, but I fancy that a watch lacks self-respect. It is always trying to run itself down.

A religious contemporary utters this wise saw: "Faith without works is useless." Of course not, and this is just what I have always said about clocks.

Here's one for the aforesaid "religious contemporary." At what time was Adam married? Why, on his Wedding Eve. See?

"Eighteen carrot soup" is the latest tempting dish amongst the vegetarian restaurants which seek to feed creation on the Nebuchadnezzarian system.

With pleasure I note that the Goldsmiths' Company have donated £50 towards the funds of the National Society. Who's next? Echo answers, "Next!"

The American newspapers report that a certain New York jeweller makes a regular business of purchasing "duplicate wedding presents." Well, why shouldn't he?

The deepest gold mine in the world is the Eureka, in California, which is down 2,290 feet, or 500 feet below the level of the sea. The deepest silver mine is the Mexican, on the Comstock, which is down 3,300 feet.

They were engaged, and stood looking into a jeweller's window. "Oh, Georgie, dear," she said, "*do* buy me a charm!" "Evely, my sweet," he gurgled in reply, "you have too many charms already." She took the compliment.

Liverpool is credited with having amongst its population a lunatic sort of a maiden who has just ordered from a Church Street jeweller, a pair of gold rimmed spectacles for her pet pug dog. Happy bow-wow!—Happier jeweller!!

Mr. R. C. Marsh, the enterprising Birmingham jeweller, &c., of 76, High Street, announces the expiration of his lease, and calls upon the public to grasp this opportunity, &c., &c., &c. Surely Mr. Marsh is never going to remove! is he?

There has just been a sale of artistic and jewelled fans at Madrid. One of the former brought as much as £190, and one of the latter was sold to a fruit merchant for £313. Moral: Always be respectful to old women who keep apple stalls.

Now for the other side of the picture. The Committee of the Birmingham Jewellers' and Silversmiths' Relief Fund are urgently requesting donations and all kinds of help. Reader, let me ask you to give your mite, and that promptly. I know that the worthy treasurer, Mr. Henry Payton, of 3, Vyse Street, Hockley, Birmingham, will receive it with pleasure, and I am certain if you knew of one-half of the appeals for help which are made daily to Mr. Henry Allen, of 42, Lower Hockley Street, Birmingham, you will be moved to help the charity substantially and *at once.*

While on the topic, let me reprint the following account which is given by my respected colleague "Robin Goodfellow" of the *Birmingham Mail.* "Only those who are aware of the deep-seated and wide distress in the jewellery trade and kindred light industries can fully appreciate the good work which the special fund raised by and administered by the jewellers of the town has done. A friend of mine whose daily duties bring him into close contact with the poorest people of the jewellers' district has told me some tales that would make folks in comfortable positions shudder. In one house not far from Constitutional Hill he found the other day a man and wife and two children, the children just recovering from a low fever brought about, if not entirely at least in a great measure, by want. There was nothing in the house that could with the utmost stretch of language be called furniture, and food was absolutely non-existent. Yet it is not so long since these children were tended and cared for in one of our handsome Edgbastonian mansions, while the refined and educated wife, brought up to every comfort of life, had her carriage and her servants. The man was then a jewellery factor, but now, after a series of crushing vicissitudes, with all his education, he cannot earn enough to keep want from his door. He had been among the number that broke stones, he had had his daily dole of provisions like many a man who was more fitted for the work, but it was not till the stoneyard was closed that he opened his mouth to my friend. Another case, equally pitiable, was that of a working jeweller, whose wife, racked with rheumatic fever, and with a few old clothes to cover her, lay in bed surrounded by five young children, while the husband said he had walked up to the stoneyard for three successive days only to find that there was no work for him. I give the cases as they are given to me, on reliable authority. They need no garnishing."

A man without hands was charged in New York a few days ago with stealing a watch. Next thing we know a legless man will be arrested for kicking a policeman, and a blind man will be accused of winking at a drug clerk behind the soda-water fountain.

Passing along North Bridge Street, Edinburgh, the other day, I observed that Messrs. W. Crouch & Sons, were announcing that they would remove early in May, to New Buildings, opposite the General Post Office, and as a consequence they had a "Great Sale" going on.

Mr. E. H. Vero, of 12, Church Street, Dewsbury, has got out a new idea in adhesive letters and figures for advertising purposes and for the new time code. He has registered the words "24 o'clock fixed like a postage stamp," and is pushing his new notion among the trade with great vigour.

It was recently announced that a post parcel from Vienna, addressed to King Milan, containing jewels to the value of 40,000 francs, intended for the Queen, had disappeared in the Belgrade Post-office. The parcel, with its entire contents, has now been found in the house of a Belgrade watchmaker, who was betrayed to the police by his apprentice.

Messrs. Moore Bros., of 38, London Street, Derby, have about the most "Birmingham" looking entrance to their factory which I have yet seen away from Chamberlainville. The firm are manufacturing jewellers, &c., and to judge by the appearance of their premises, you might be in front of one of the Vyse Street or Hockley firms instead of one at Derby.

Last month I spoke of a freak of a Mr. Gardner, of Boston, and I have now unearthed another similarly singular act. About 1770 there was living in London a tradesman who had disposed of eleven daughters in marriage, with each of whom he gave their weight in halfpence as a fortune. The young ladies must have been bulky, for the lightest of them weighed £50 2s. 8d.

Allow me to raise my hat, please. Mrs. Henry Cottrill carries on the business of a watchmaker, goldsmith, silversmith, and working jeweller, electro-plater and gilder, and, in fact, all the entire list of branches of the trade, at 3, Mardol Head, Shrewsbury, a few doors out of High Street. She repairs and keeps in order church and turret clocks, &c., and, therefore, I make her the politest bow my poor old weary frame will permit.

Mr. Thomas Middleton, of Lady Bridge, Lady Lane, Leeds, is firmly of opinion that young couples can *only* be happy after marriage if they have bought their "lucky guinea gold" wedding-ring from him. He says so in print; and besides this, is philanthropic enough to give—as usual—half-a-dozen electro silver spoons with each ring, just as though couples were not "spooney" enough at the time they buy a wedding-ring!

The following conversation is said to have occurred between two pitmen at a missionery meeting held in a Newcastle Wesleyan Chapel:—First miner: "Whaat's that thing yon chep hes aboot his neck?" pointing to the ex-mayor, who, with his regalia of office, occupied the chair on that occasion. Second miner: "Wey, man, that's the mayor, and yon's his chain of office. Wivoot it, he wad luik as nakit as thoo in the toon on a pay Saturday wivoot thy dog!"

For right down mean, spiteful, personalities—which masquerade as jokes—permit me to commend the new order of paste-pot-and-scissors, give-a-prize-every-week, school of papers. As an instance of what I mean, I reprint the following from a journal which I will call "*Brick-Bats.*" "'Time is money'—that's a fact, and if you wish to know the value of time, just get a little speck of dirt in your pocket chronometer and take it round to a watch-tinker: he'll blow in it a couple of times and charge you 2s. 6d. for repairs."

My valued and respected friend, Mr. C. W. Finken, of Netherfield House, Hoyland, near Barnsley, is hereby tendered my congratulations for his wonderfully cute idea in inventing, arranging, and patenting the best 24-hour system for watch and clock dials I have yet seen. I would like my readers to know more about this good thing, and so will say that the patent is dated January 3rd, 1885, and numbered 129. I believe Mr. Finken is willing to sell the patent, so there's a little fortune waiting for somebody.

"Mr. Westwood, of Warstone Road, writes to me as follows:—'Referring to the paragraph in "Table Talk," concerning a swindling transaction in jewellery, of which I was one of the victims, I should like to explain that my son was fully justified in receiving by cheque payment from the man, seeing that we have known him in business for several years. The article in your paper seems to have given the impression to the trade that my son was dealing with an entire stranger, and in justice to him, I should be glad if you would give this version of the affair.'"

During the recent visit of the British Association to Canada the members visited the gold mines in the Montagu district, near Halifax, where they inspected the rich-yielding mines, and admired the splendid machinery crushing the quartz. A company is now in course of formation in England to purchase and extend one of the best of these mines, and the shares are being rapidly taken up. The company will be called the New Albion Gold Mining Company, and probably in the history of such undertakings none were ever promoted with such rare prospects of success. The mine is now being worked with an 8-stamp mill, and it is contemplated to erect one three or four times the size. A telegram from Halifax, dated the 20th ult., says that the present yield is over four ounces of gold per ton of ore.

"One word is as good as a thousand," therefore I will allow the following excerpt to speak about the presentation clock on its own account:—"The clock was obtained from Mr. Henry Robinson, High Street, Shrewsbury, and is designed to stand on a bracket. It is in a handsome ebony and ormolu case, and goes for eight days. It chimes at pleasure either on eight bells or the Westminster chimes, and, if wished, it can remain silent. At the bottom of the clock is fixed a gold plate, bearing the following inscription:—'Presented to Sir Offley Wakeman, Bart., Worshipful Deputy Provincial Grand Master of Ancient Free and Accepted Masons of North Wales and Shropshire, by the Brethren of the Lodges in the Province, as a mark of their esteem, on the occasion of his marriage with Miss Rouse Boughton, January, 1885.'"

An interesting relic of the old Mansion House has just been acquired by the Corporation of Newcastle. The relic in question is a venerable clock which was sold when the Mansion House was dismantled. Passing from one hand to another, the article came into the market a short time since, when it was repurchased by the Corporation. Besides having an interesting history, the relic is a rare specimen of horological mechanism. Once wound up, it will run for 365 days, the face showing the phases of the moon, the months of the year, the days of the month, and the hours and minutes of the day. From the record on the relic itself, it appears to have been manufactured by Thomas Walker, once a well-known clockmaker in Newcastle. Mr. Walker is said to have made two of these clocks, one of which is now in the possession of the Duke of Northumberland.

The *Newcastle Chronicle* is responsible for the two ensuing stories; but whether true or otherwise, they are too good in their way to lose:—

"Twenty-fower o'clock.—Some workmen were talking in Newcastle the other day about the change made in reckoning the time. 'Begox,' remarked one, 'this twenty-fower o'clock's a bad job for the tramcar men.' 'Hoo's that?' asked a companion. 'Wey,' was the reply, 'thor elwis expected to work the clock roond, and a little bit ower!'"

"Sun-Dials.—Last week, as some men were conversing about the alteration of the clock figures to the 24 hours, reference was made to the dial in the Armstrong Park. 'Whaat a fine time-keepor it is!' said one; 'it keeps time tiv a minute when the sun shines.' Another remarked, 'But Geordie Stephenson's sun-dial at West Moor Colliery is a better yen.' A third eagerly asked, 'Aa wundor if its gannin yit, for it's a lang time since aa've seen't?'"

But hadn't we better look at home, too! Let me tell you of a little affair at the Birmingham law courts recently. Mr. Justice Field, it seems, is not averse to a little jocularity. During the hearing of an action in which the quality of some silver-plate was called in question, and whilst his lordship was addressing the jury at the termination of the case, some of the goods were brought into court. His lordship looked displeased, and after finishing his remarks, and whilst the jury were considering their verdict, he told the counsel engaged in the case that it ought not to have been produced. "Not but what they look very pretty," he added. "I will give you 2s. for that sugar basin." Mr. Hugo Young, to whom he spoke, conferred with his client, and handing the sugar basin towards the Judge, said they would be very glad to get what they could for it. "Oh, then," said his lordship, amid much laughter, "I will only give eighteenpence." At this point the jury turned round with their verdict, and whether or not the bargain was subsequently completed I am not able to say.

The Invention of Pendulum Watches.

By Max Pemberton, B.A.

A VERY natural comment by a very practical man on seeing a title of the sort with which I have prefaced my short article, would be "What is the real value to anyone of of a discussion which has for its object the settlement of a dispute as to whether Jones or Smith invented the spring balance to watches?" but I venture to think that there are men sufficiently interested in anything connected with their trade to analyse even a point such as this, and to give honour where honour is due.

The common invention of what used to be called the pendulum watch, from the regularity of its stroke, is of course, and rightly so, attributed to the great philosopher and scientist, Dr. Hooke, and rude though his first attempts undoubtedly were, yet it is always to be remembered that he was the first who ever thought of the idea of men carrying miniature clocks about with them, and also *facile est inventi addere*.

Dr. Hooke also, it is commonly known, invented several ways of regulating his watches, the most important of which, viz., the spiral spring, is more commonly ascribed to Huygens and not to Hooke. Let us make examination, then in a few lines of their respective claims. We find in some old chronicles the copy of an agreement between Lord Bromecher, Mr. Boyle, and Sir Robert Murray with Robert Hooke, Master of Arts, to this purpose, viz., "That Robert Hooke should discover to them the whole of his invention to measure the parts of time at sea as exactly and truly as they are at land by the pendulum clocks." Thus proving that the invention of the pendulum clock was for some time at least ascribed to Dr. Hooke. Now how did Huygens get to hear of Hooke's invention of the spring balance? It seems to have been this way. Hooke was in the habit of experimenting and inventing in nearly every known branch of science in his day, and oftentimes he happened upon a discovery which when found he would let lie and make no use of. This seems to have been the case with his invention of the spring balance to watches he having invented it and confided the invention to one Sir Robert Moray. Now Huygens at this time (1665) was experimenting in balances, and Mr. Oldenburgh was his most intimate friend. Now mark the proof: we find a letter from Sir Robert Morray to Mr. Oldenburgh, dated Sept. 30, 1665, and containing the following: "You Oldenburgh will be the first to know when his (Huygen's) watches will be ready, and tell me what he has done. You may ask him if he does not apply a balance to the arbor of the spring? and that will give him occasion to say somewhat to you. If it be that, you may tell him what Hooke has done in that matter, and what he intends more." Now although we have no direct evidence that Oldenburgh wrote to Huygens, yet we may very safely conclude that he did, and hat Huygens from this derived the idea of Hooke's invention.

Huygens' discovery was published first in the *Journal des Scavans*, and from thence in the *Philosophica Transactions* for March 25th, 1675, about ten years after the letter of Sir Robert Morray, and nearly fifteen after Hooke's first discovery of it. Perhaps a few words on the difference between the watches of Huygens and Hooke would not be altogether out of place. They agreed in the application of the balance, only Mr. Huygens had a longer spiral spring, and the beat was much slower. They differed in this way:

1st. In Huygens the verge had a pinion instead of pallets, and a contrate-wheel ran therein and drove it round more than one turn.

2nd. The pallets are on the arbor of this contrate-wheel.

3rd. Then followeth the crown wheel.

4th. The balance instead of turning scarce quite round doth turn round several times every vibration.

The result of this whole analysis then seems to be that Dr. Hooke is the inventor. To him then be the honour.

I will conclude these few lines with a remark or two on the Invention of Repeaters.

They were invented by one Mr. Barlow in the latter end of the reign of Charles II., about the year 1676. Mr. Tompson seems to have been the worker who first made them from Mr. Barlow's idea.

A Mr. Quare had made an attempt some years before, but had laid it aside. When Mr. Barlow produced his invention Mr. Quare also brought his forward, and two watches being constructed the King gave the preference to Mr. Quare's. Mr. Barlow's was made to repeat by putting two pieces, one on each side of the watch box, one of which repeated the hour and the quarter. Mr. Quare's was made to repeat by a pin that stuck out near the pendant, which being thrust in did repeat both the hour and the quarter with the same thrust.

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Correspondence.

To the Editor of the Watchmaker, Jeweller, and Silversmith.

Dear Sir,—Having carefully studied Cassell's Text Book on Watch and Clock Making, by Mr. Glasgow, I find one or two points which I cannot quite understand; one in particular being the horizontal escapement, which, as a jobber, I feel is an escapement we ought to fully understand, as we have more Geneva watches than any other to repair. Mr. Glasgow, in his way to plan the escape, places the 20 deg. of lift on the tooth of wheel in such a manner that it gives 40 deg. impulse to the cylinder. He then gives 18 deg. angle for the back of the tooth to free the cylinder. I never saw one in practice more than 12 or 14 deg. I should like Mr. Glasgow to explain these points more in detail, not only for the benefit of myself but for others. Mr. Tripplin, in an admirable lecture delivered by him at the British Horological Institute, puts the angle in such a way that it cannot be made more than 20 deg. I think any one reading the book will see the necessity of further explanation. I also see that Mr. Glasgow takes to himself the honour of inventing the going barrel with the pivoted piece running in the slide after he had had it pointed out in the *Horological Journal* that it was an old invention. I am sorry to see such things, as it is apt to shake our confidence in his book.

I am, yours respectfully,
JOBBER.

To the Editor of the Watchmaker, Jeweller, and Silversmith.

Sir,—The *Horological Journal* has assumed a power and a sapiency which will agreeably meet the difficulties of the actual condition of the English clock and watch trade.

This intimation alone is worth the risk of having vexed unnecessarily the great thinkers and writers of that "monthly."

Although I may regret having ventured to touch upon the science of "Horology," which, I must take it, is solely within the province of that "journal," there is considerable gratification to be derived from the interest my effort is awakening in the important question of improved "Time recorders," and the acknowledgments of the value of this first effort.

There was a time when "Horology" was the study of all scientists, and the greatest discoveries in that science were made by the combinations of other sciences, which more recently became a branch of industry under the designation of the clock and watch trade.

We have all much to learn before reaching *complete perfection*, and I shall be glad to glean from the *Horological Journal* for many of my (perhaps otherwise futile) labours.

There is a motto "small beginnings have great endings," the application of which is the right of each one, and I trust the the *Horological Journal* will not be an exception.

Your obedient servant,
C. E. PARKES-RHODES.

Free International Institute for Commerce, Trade,
Industries, &c., 130, Fleet Street, London, E.C.

Skilled Labour.

By Chas. Reiss—Albany, N.Y.

SKILLED labour is the bulwark of all industry. It is to skilled labour that our country owes her proud position as first among the nations of the earth in the arts and sciences; it is to skilled labour that she owes her prosperity. By means of it our people have conquered the waste places of a continent and made them to "blosson as the rose." A nation of inventors; and invention is the legitimate offspring of intelligence and ambitious labour; it is the product of the brain of the superior workman at his daily task, whose constant thought is to bring forth something which shall be of benefit to mankind and to himself as an interested atom of humanity. Without skilled labour we should be simply a nation of drudges, knowing nothing beyond incessant manual labour and literally "earning our bread by the sweat of our brow." Skilled labour means something more than physical exertion; it comprehends the minute workings of an active and educated brain, with the dexterity of trained hands and eyes. The stevedore who handles freight upon our docks is a labourers; the men who dig ditches and break stone are labourers; but these operations require neither intelligence nor previous training. All that is required to make a man successful in the pursuit of these callings is a strong physique, abundance of muscle, and patient endurance. It is not necessary that they should possess intelligence, or, for that matter, that he should be encumbered with a brain, while a stomach he finds to be an annoying and inconvenient embarrassment. Intelligence, or skilled labour, has enabled us to, in a great degree, do away with the stone breaker, and the ditcher, by giving us machines which perfect the work quicker and better, and whose endurance is by far superior. Of course we cannot dispense with the ordinary labourer, for many things machines cannot do can only be performed by manual labour. The more encouragement is given to our intelligent workmen the more diversified become our industries, and, consequently, the more avenues are opened up to our labourer (to the ordinary labourer) to earn his living, or to advance himself in the scale of labour, if he be at all ambitious. The Chinese are an industrious, hard-working people, many of them skilled in the arts and sciences, possessing intelligence and perseverance, yet they seem to lack the inventive faculty.

As imitators they are immensely successful, as has been proven by the style and manner in which they have appropriated American ideas, first made known to them at Philadelphia's Centennial Exhibition.

But while they have succeeded in copying our manufacturers, for lack of the necessary training they have been unable to apply many of them to the purpose for which they were intended. Reapers, harvesters, threshing machines, and steam engines have been exactly copied in every part, but, for lack of that training which enables a skilled workman to know the value of that which he produces, and the relative value of each part, these people have obtained little good from the exercise of their imitative faculties. It should be the ambition of every employer of skilled labour to encourage his workmen to an exhibition of the best that is in them, to stimulate their ambition, and in every way to elevate the standard of the craft with which he is identified.

It should be the ambition of every workman to excel in what he has undertaken; to make himself master of his business; to know it in all its details, and comprehend the reason for everything he does; to make of himself, in fact, an artificer and not a mere labourer.

The art of watchmaking is classed among the sciences. It ranks above the mechanical arts, because its successful prosecution involves one of the sublimest sciences—that of astronomy. Berthout, the famous French horologer, who has written much that is of great value upon the art of watchmaking, says: "To become a good watchmaker it is necessary to be an arithmetician, in order to find accurately the revolutions of each wheel; a geometrician, to determine correctly the curve of teeth; a mechanician, to find precisely the forces that must be applied; an artist, to be able to put into effect the principles and rules which these sciences prescribe. He must know how fluids resist bodies in motion, and be well acquainted with the effects of heat and cold on different metals; in addition to these acquirements he must be endowed by nature with a happy genius, to be able to apply them all in the construction of an accurate measurer of time." It is a fact, as much to be lamented as it is noticeable, that the number of competent and thoroughly skilled watchmakers in this country is "growing smaller by degrees." Few persons undertake now-a-days, to learn the art in all its perfection; but becoming expert in some particular branch, are content to confine themselves to that branch. Some years ago it was stated in evidence before a committee of the British House of Commons, I can recall, that there are one hundred and two distinct branches of the art of watchmaking, to any of which a boy or a girl might be apprenticed; and that, after having learnt that branch they would be unable to pursue any other without further instruction. It is only by years of study and intelligent application in a private workshop, that an apprentice can hope to learn the art thoroughly. The introduction of machinery so generally of late into the watchmaking business, has tended especially to educate workmen to special branches of the art. An apprentice enters one of our large factories and he is soon placed in charge of a machine which makes some peculiar portion of a watch; a wheel, or a pinion, or some other essential. He soon becomes expert in the management of that machine, and is kept there as long as possible, because his labour in that speciality is more profitable to his employer. During his apprenticeship, if he be ambitious, he may learn how to make a dozen or more parts of a watch, but he cannot make a watch, nor is he taught the relative value of each part to the other. Let him go, at the end of his apprenticeship, into the workshop of some well-known, thorough and conscientious watchmaker, he will find that he knows very little about his business, and will have to learn his trade over again. Machinery has had a tendency, also, to reduce the price of labour, which, taken in connection with the specialty work, has done much to degrade the art. There is so much competition in the business that manufacturers must economise at every point, and some few, with a short-sightedness that is amazing, have reduced, or attempted to reduce, the wages of their workmen. This may do with unskilled labour, with men and women whose work is purely mechanical, almost automatic, requiring no special intelligence; but with the skilled workman, upon whose conscientious labour the employer must depend for the character of his product, the effect cannot be otherwise than injurious—degrading the artisan to the level of the labourer, and blunting his conscience. His work becomes irksome, because not adequately recompensed; he grows careless, and the quality of the goods depreciates in his hands, to the detriment of the employer, who, in the end, becomes the greater sufferer by reason of the depreciation of his standard of workmanship. The public, too, suffers by having imposed upon it an inferior article, branded with a trade mark that should be a guarantee of superiority. Skilled labour should be encouraged, not degraded, and nothing will so quickly demoralise workmen, good or bad, as cutting down their wages below a reasonable standard. Watchmakers are reasonable, thinking men, who have during the hard times of past years cheerfully accepted such reductions as the condition of trade seemed to demand; to coerce them still further will result in deteriorating the quality of their work. On the contrary, as there must follow an evident improvement in business generally, which improvement must likewise be felt by the watch trade, I hope to see the wages of skilled workmen increase correspondingly. As I have already intimated, there is no one of the mechanical arts so dependent upon the skill of its workmen as that of watchmaking. Some special effort should be made by those interested in the business to increase the number of workmen—apprentices rather—who are desirous to learn the trade thoroughly, in all its branches, and to master all its intricacies. The subject is becoming a serious one, and one that is causing the thinking men in business much anxiety. It would be well for those interested to consider the propriety of doing something, as a private enterprise, for the protection of the vast amount of capital floating in the business. Skilled labour—thorough artisans—is what the watchmaking guild now requires. The first step towards securing them is to enlarge the opportunities of apprentices, and elevate, not degrade, the standard of workmanship. There is already a plethora of workmen in the business; what is wanted is that they shall be educated up to the highest standard of excellence.

Hall-Marking.

In the House of Commons on Thursday, March 26th:—

Mr. Slagg asked the President of the Board of Trade whether watch cases of gold or silver with metal domes were not permitted, under the Hall-marking laws, to be manufactured in the United Kingdom, but watches of foreign manufacture, in cases of gold or silver with metal domes, were largely imported into this country.

Mr. Chamberlain: The hon. member correctly describes the existing state of things, which it would be desirable to remedy whenever practicable. In the present state of public business I am afraid I cannot hold out much hope of legislation during the present session either on the question of Hall-marking generally or of Hall-marking of watch cases.

A Few Words about Adjusting Fine Watches.

THE term adjusted "should include all of the adjustments named," but as generally used by manufacturers, it means the same as "compensated" for heat and cold, which is only one of the adjustments needed by a really fine movement; and before any adjustment at all is attempted, there are numerous mechanical points to be attended to in order to get the movement in fit condition for such adjustment. It will be useless to spend time in adjusting a cheap movement, or one much out of order, as the mechanical imperfection would do more to disturb its running than the adjustment could do to perfect it. The whole subject of adjustment is intricate, and becomes more and more difficult as we seek greater perfections. Few watchmakers understand it fully, and a large share do not know what it means. Yet, in these days, when good watches are to be found everywhere, any workman is liable to be called upon to repair or examine one, and if he does not know at least a little something about such things, he will cut a rather sorry figure in the customer's eyes. He may do the watch many dollars' worth of damage, without knowing it, simply from not understanding how an extra fine watch should be treated. Every watchmaker should inform himself at least enough to avoid any danger of such an occurrence, both for his own credit and to save himself from possible prosecutions by the owners of the injured mechanism. Every student of horology who desires to learn all he can of this art should study really thorough books on this subject, such as "Saunder's Modern Horology." Even if the workman does not intend to undertake the isochronical adjustment, it is important that he should know how to discover whether the watches he buys and pays an extra price for, as isochronized, are so or not, for there is as much swindling of ignorant dealers on "isochronal hair springs" as on compensation balances adjusted for heat and cold.

The Earth's Magnetism.

By E. R. P. Shurly.

THE earth is a great magnet, and a powerful one too. Everything on the earth and in the air above is permeated with this magnetic force—it goes through your clothes, it penetrates your bodies, it saturates your brains—it is part of life itself.

Gaus, the illustrious German astronomer, has computed (taking as a unit of his measure, a magnet 14 inches long, 1 inch wide, $\frac{1}{4}$ inch thick, weighing 1 pound, made of the hardest steel, and of the strongest magnetic force possible), the earth's magnetic force as equal to 8,464,000,000,000,000,000,000 such magnets. The attracting or lifting power of such a magnet is about 10 pounds, which would make the attractive power of the earth 42,310,000,000 000,000,000 tons. If this magnetism were equally distributed throughout the mass of the earth, the magnetic intensity of each cubic yard would be equal to six of these magnets, or about 60 pounds attractive force.

Professor Mayer has shown that this magnetic influence, this insensible force, is a power filling space to an unknown distance (radiating in the lines of magnetic force very much as the rays of the sunlight, the lines of the earth's magnetic force being from south to north, as indicated by the compass needle). We move and live in this mysterious influence—the legs of the pedestrian cut the lines of force—the street cars and vehicles drive through it, and every time these lines or rays of force are cut, especially by a metallic body, an induced electric current is produced, a condition is disturbed, a power is set in motion, for an electrical current is a power. This is shown by the Professor in this simple experiment: Take a piece of copper wire, bend it into a circle of eighteen inches in diameter, and attach the ends to conducting wires connected with a galvanometer, and move or vibrate the ring, so that it will cut the lines of the earth's magnetic force, and an electric current will be induced sufficiently strong to deflect the needle thirty to fifty degrees.

A small piece of iron or steel, free from magnetism when laying flat, if placed perpendicularly or inclined, will receive an induced charge of the earth's magnetism sufficient to deflect or rotate an ordinary compass needle, the lower end always taking the south pole, and the upper end the north pole of the needle. This disappears when the iron or steel is laid level again, but if the piece of iron or steel is held so as to point in the line of magnetic force, and vibrated as with a sudden blow sufficient to agitate the molecular atoms of which it is composed, it will become magnetised or a permanent magnet.

Two metals placed together, like brass and steel, induce a mild electric current, especially when the temperature is raised. A metal ring when revolved over or in proximity to another produces a current, and encounters a resistance from the disturbed electric or magnetic conditions. A cube of copper, say of one inch, if made to revolve between the two poles of an electro-magnet by means of a twisted thread, will instantly stop when an electric current is turned on. A copper disc swinging freely over an electro-magnet, will rapidly revolve when an electric current is applied to the magnet, and require considerable force to rotate it in the opposite direction, and if force is used to revolve it in the opposite direction, it will become quite hot from the resistance of the magnetic force.

"The earth being a great magnet, currents of electricity must be induced in all conducting materials in which motion takes place at its surface."

Now if we apply these facts, discovered by the investigations and experiments of our most noted scientists, to the watches we carry in our pockets, shall we not have the cause of their variations and unaccountable behaviour which have puzzled watchmakers and horologists for many years?

Many fine watches have been discarded as worthless within a few years, no one being able to "find out what ailed them." Now, have we not the key to all this trouble? if we know the cause we can apply the preventive. If we let the balance wheel of the watch represent the wire ring used by Professor Mayer, its motion is retarded or accelerated as it crosses the lines of magnetic force. The combination of brass and steel, of which it is composed, swinging rapidly over and in close proximity to other pieces of metal, must encounter a certain electric or magnetic resistance—a sort of brake as it were—and all these influences are intensified or aggravated by the thermal currents induced by the heat of the body, electricity, and magnetism produced by the motion of the body, the friction of the clothing, &c.

If the experimental ring of Professor Mayer in making vibration, cutting the lines of magnetic force, moving the galvanometer of 30 degrees, encounters a "brake" resistance equal to 1-1,000 part of a grain, then the balance of a watch making its revolution at much greater speed (the very liberal allowance being made that these conditions offset difference in size—viz., the balance—composed of a combination of metals, greater speed, and longer vibrations) would encounter the same resistance when under the same lines of magnetic force, and the balance revolving 18,000 times per hour, we should have a resistance of eighteen grains per hour to overcome (the application of one grain to the balance at once would vitiate the timekeeping of the watch), and if this resistance were equal during the twenty-four hours it would be 432 grains; but this could be easily overcome, and the watch regulated if it were uniform, but the influence on the watch is constantly varied as the wearer moves about, crossing the lines of the earth's magnetic force, or passing through the different mechanical magnetic influences at the present time so numerous.

A watch is the most delicate piece of mechanism known. It is the culmination of mechanical skill in delicate adjustments, and is of necessity made of metals the most susceptible of magnetic and electric forces. The operation of turning, polishing, and finishing steel, leaves in it a residual force of magnetism; its molecular atoms are in a "tonic state," ready to be acted upon or effected by the slightest outside force. Watchmakers and horologists have given their skill to the adjustment of a watch to "position," which is to equalise the effects of gravity on the balance, "temperature" or variations in heat and cold, and to "isochronism," which is to equalise the force of a recoil in the hair-spring. All this has been accomplished to perfection, as these forces are definite and regular. But they have overlooked the greater power of magnetic and electric force—the subtle influence—which is the strongest when the other adjustments are the most perfect—for it is a law of magnetism to seek fine points, and a nicely poised balance is more easily affected, and a closely coiled hair-spring is a fine pathway or repository for these forces.

I order to protect a watch from these magnetic and electric forces, we must control or conduct them, and so arrange that they meet and neutralise each other, and an equal power exerted on all sides, in other words, we must make a neutral center, a sort of "charmed circle," which the lines of magnetic force cannot cross.

The cup repesents an anti-magnetic shield, which is made of size and form to surround a watch movement, placed on a horseshoe magnet about six inches long and quite powerful. A piece of cardboard two or three inches square (a large-sized jewelry card is convenient for this experiment) is placed on the shield, some soft iron filings are scattered over the card outside the shield, and if the card is gently tapped with a pencil the filings immediately move and announce themselves in the lines of magnetic force. If the shield is removed and the card held in the same position as before, and jarred a little, the filings will move in a line between the poles of the magnet, which is in the line of greatest force.—*American Jeweller.*

Miscellaneous.

THE city of Exeter had a prestige which it seemed likely to lose. In these days it does not certainly count for much, being chiefly of an antiquarian character; but at one time it constituted the pride of the great capital of the West. In the fourteenth century the work of a goldsmith had a kind of national importance. All sorts of statutes limited their labour and kept the standard of the metal up to a fixed quality. It was in 1379 that Parliament, rccognising and indeed reciting that English goldsmiths, being their own assayers, produced gold and silver works of a metal less fine than it ought to be, proceeded to enact that every goldsmith should have his own proper mark upon his work and that the assay of touch should belong to the mayors of cities, and that the work should bear the mark of the city where it was assayed. In those days French coins were of fine gold, and "the touch of Paris" was a recognised standard of purity frequently alluded to in the English statutes. Louis XI. indeed granted to the goldsmiths of Tours a right to make reliquaries of gold and silver of base alloy, but they were to be inscribed "Non venundetur" to certify that they were not destined for commerce, but only for ecclesiastical purposes. Various statutes of Henry V., Henry VIII., and Elizabeth were passed to ensure the purity of gold ware, till in comparatively recent times—in fact, the first year of the last century—certain cities were appointed for the assaying and the making of wrought plate. These were York, Exeter, Bristol, Chester, and Norwich. An old Act of 1424 has conferred the same privilege on these cities in Henry VI. time, but it had been discontinued and forgotten. From 1701 Exeter had its city hall mark of a letter X crowned, which was subsequently altered to a castle of three towers, but earlier pieces of Exeter ware display the words Easton, Exon. or Eston. At present this activity of the goldsmith's trade in the West has subsided. Depression tells heavily on articles of luxury. The Exeter Assay Office has been closed, and goods manufactured there have to be sent to London or Birmingham to receive the marks which the old statute still makes compulsory in the case of silver plate.—*Daily News.*

Diamond Market Reports.

Amsterdam, March 10.—There is but little change at our place. Affairs are unsignificant, and not remunerative. The rough stuff is kept too dear in London to leave a profit on finished goods. There is but little work going on at present. Much of the rough stock remains unsold.

Paris, March 9.—The situation of our place is trist. The many forced sales which took place, and take place yet, were very detrimental to the diamond trade. Actually some qualities are scarce at our place. Nevertheless the merchant keeps back in buying, for fear that the next day somebody else offers the same article for less money. It is a pity that there is so little combination in the diamond trade.

London, March 9.—Last week the mail steamer was in very early, and brought something less than the usual average quantity. There has been a good number of foreign merchants here, but prices running high, sales were limited. Yellow was neglected, whites, clearage and slightly picked were in demand. The mail steamer *Roslin Castle* has already been cabled on Thursday last, and is expected to arrive to-day. The mail steamer *Tartar* left Capetown on the 28th of February, and may therefore be expected at Plymouth (London) on the 18th or 19th of the present month.

Kimberley, February 7.—For some weeks there has been a steady decline in prices, and at ruling quotations, the market is rather in favour of shippers, the limitation of the out-put is moreover a strong factor in operating against a further fall in value. Business, however, continues exceedingly dull, fresh goods sell freely, but are mostly purchased and retained by shippers, and very little stuff changes hands.

Bankruptcy Proceedings, &c.

Barkshire, James, 1, St. Mary's Parade, Minster Street, Reading, Watch and Clock Maker, Gold and Silversmith, Jeweller, and Optician. Hearing at the Reading Court, on April 16th, at Two.

Buckley, Joseph, 200, Shoreham Street, Sheffield, Silversmith's Manager. Hearing at the Sheffield Court, on March 19th, at Half-past Eleven.

Burgess, William (trading as Burgess & Co.), 10, Hilton Terrace, Fulham Road, London, Watch and Clock Maker, Jeweller, Silversmith, and Electrician. February 23rd. Examination at 34, Lincoln's Inn Fields, London, on April 1st, at Eleven.

Garsed, David Benjamin, Argyll Buildings, Huddersfield Road, Elland, Watchmaker and Jeweller. Proofs by March 7th. Trustee, Thomas England, Official Receiver, Town Hall Chambers, Halifax.

Holloway, George Henry (trading as H. Holloway & Co.), 128 and 129, Minories, and 19, Park Road, London, Clock and Watch Dealer. Hearing at the High Court of Justice in Bankruptcy, on April 17th, at Twelve.

Levy, Barnard, 30 and 32, South Castle Street, 78a, Bold Street, and 53, Catherine Street, all in Liverpool, Jeweller and Watchmaker. Absolute Order of Discharge granted. January 16th.

Pinder, Charles, 44, Bark Street, Bolton, Watchmaker and Jeweller. Proofs by March 19th. Trustee, Thomas H. Winder, Official Receiver, Bolton.

Reid, John Elric, 27, Sandhill, Newcastle-on-Tyne, Watchmaker and Jeweller. Hearing at the Newcastle-on-Tyne Court, on April 24th, at Ten.

Samuel, Abraham Jacob Wolf (trading as the Patent Firewood Co.), 43, Bedford Street, and 115, Islington, Liverpool, lately trading with Simeon Wolf Samuel (as A. J. W. Samuel & Co.), Wholesale Jeweller. March 3rd. Examination at the Court House, Government Buildings, Victoria Street, Liverpool, on March 16th, at Twelve.

White, Beren (trading as Benjamin White), 76, Mulgrave Street, and 21, Parker Street, Liverpool, Watchmaker and Jeweller. Discharge refused, with liberty for the bankrupt to apply again for his discharge. February 13th.

Dissolution of Partnership.

Andrews, Francis, & Alfred George Biden, 107, Hatton Garden, London, Diamond Brokers. January 16th. Debts by Francis Andrews.

Chadwick, William Watkins, & Jeremiah Martin John Danks (trading as W. W. Chadwick), Bath House, Holyhead Road, Coventry, Watch Jewellers. March 11th.

Bills of Sale.

Bromfield, Walter James, 126a, Spon Street, Coventry, Watch Jeweller. March 10th. £80. Given to Charles F. Barnard.

Cartwright, George Frederick, Victoria Villa, Warwick Road, Solihull, Jeweller. (By direction of purchaser.) March 17th. (Settlement in trust for wife.) Given to Joseph Taylor and another.

Clarke, John Hewitt, 2, Wootton Villas, Slade Lane, Gravelly Hill, near Birmingham, Jeweller. February 26th. £30. (Absolute sale.) Given to John E. Makepeace.

Cole, Thomas, 102, St. John Street, Clerkenwell, Jeweller. March 6th. £50. Given to Walter Blunt.

Dean, James, and William Clarkson (trading as Dean & Clarkson), 11, Ivy Lane, City, Gold Beaters. March 18th. £180. Given to Ralph Dean.

Hall, Matthew, 10, Leighton Road, Kentish Town, Jewellers' Manager, &c. March 13th. £35. Given to the London and Westminster Loan Company.

Hutchinson, Isaac, 81, Main Street, Egremont, Watchmaker. March 18th. £30. Given to John C. Porter.

Lloyd, Louisa, 196, Oldham Road, Manchester, Jeweller. February 28th. £100. Given to James E. Clegg.

Parker, John, 15, Osborne Grove, Tollington Park, Watchmaker. February 19th. £30. Given to Thomas Smith.

Read, Charles Allen, The Roselands, Cricklewood Lane, Cricklewood, and City, Watchmaker and Jeweller. March 12th. £100. Given to Henry Tyler.

Richardson, Edwin, 3, Claremont Road, Handsworth, Jeweller. March 18th. £226 10s., &c. Given to John W. Rolason.

Robinson, Charles, 58, Cassland Road, South Hackney, Jeweller, &c. March 13th. £30. Given to Benjamin Blaiberg.

Sinclair, Walter, Percy Villa, Hemberton Road, Mayflower Road, Clapham Road, Jeweller, &c. March 6th. £150. Given to the London & Westminster Loan Company.

Thomas, Sidney, 41, Godolphin Road, Shepherd's Bush, and 47, Albemarle Street, Jeweller. (Of property at 41, Godolphin Road.) March 6th. £200. Given to W. Furber and others.

Applications for Patents.

2836. William Lloyd Wise, 46, Lincoln's Inn Fields, London, W.C., for "Improvements in time-keepers." (Wilhelm Osborne, Germany.) 3rd March, 1885.

2962. William Anderson Lait, 52, Chancery Lane, London, for "Improvements in clocks and timepieces." 6th March, 1885.

2984. Hermann Wagner and Maurice Gerstley, 4, South Street, Finsbury, London, for "Improvements in or applicable to watches." (Louis Brandt et fils, Switzerland.) 6th March, 1885.

3071. John Harrington, 23, Southampton Buildings, Middlesex, for "A combined clock-case and cabinet." 9th March, 1885.

3210. Richard Godfrey Webster, 5, Queen Victoria Street, London, for "Improvements in 24 hour watches and clocks." 12th March, 1885.

3357. Raoul Vigier, 53, Chancery Lane, for "Improvements in watches and clocks. 14th March, 1885.

3388. Richard Morton Robinson, Mortsden, Derwentwater Park Estate, Acton, and Abraham Kaufmann, Foote's American Hotel, St. Martin's Street, Leicester Square, both in Middlesex, for "An improved construction of watch and clock dials, and apparatus connected therewith." 16th March, 1885.

3429. Joseph Whitley, Railway Works, Leeds, Yorkshire, for "Improvements in the construction of rockets." 17th March, 1885.

3496. John Edward Walsh, Waterhouse Chambers, Crossley Street, Halifax, Yorkshire, for "An Improved automatic fastener for jewellery." (Emanuel König, Belgium.) 18th March, 1885.

3520. James Kendal and Marc Laval, 321, High Holborn, London, W.C., for "Improvements in or applicable to watches, clocks, and other time-keepers." Complete Specification. 18th March, 1885.

3628. Alexander Melville Clark, 53, Chancery Lane, London, W.C., for "Keyless central winding mechanism applicable to all kinds of clockwork." (Victor Emile Versepuy, France.) 20th March, 1885.

3631. Charles Ankers, 11, Pillory Street, Nantwich, Cheshire, for "Improvements in the mechanism of watches, clocks and other timepieces." 21st March, 1885.

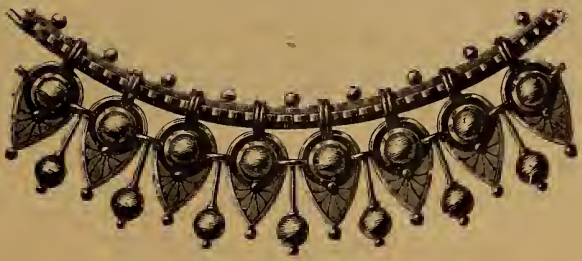
3647. Benjamin Edward Halford, 15, Monument Road, Birmingham, for "Improvements in that kind of jewellery known as bracelets and bangle bracelets, and in the method of manufacturing the same." 21st March, 1885.

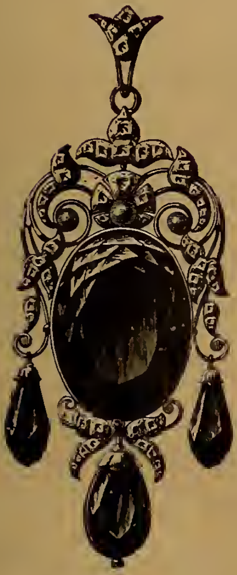
3887. William Foster, 5, Chancery Lane, London, W.C., for "A new or improved 24-hour clock." 26th March, 1885.

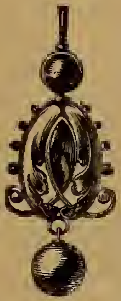
3898. George William Warren, 46, Lincoln's Inn Fields, London, W.C., for "Improvements in time-keepers." 26th March, 1885.

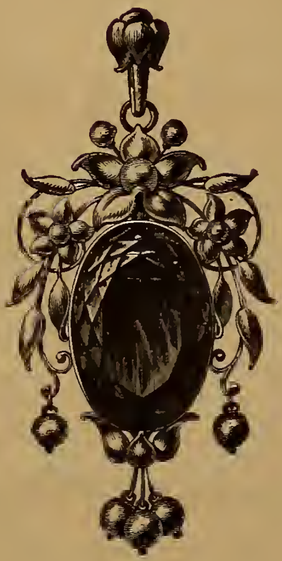
Supplement to the Watchmaker, Jeweller, and Silversmith, April 6, 1885

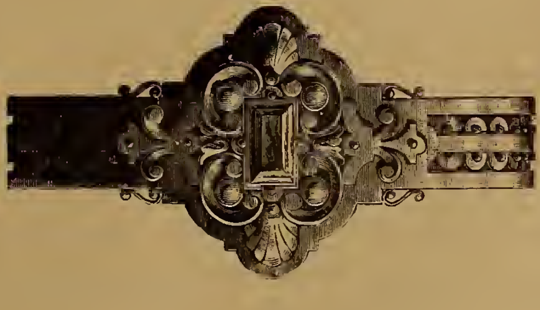
MONTHLY SUPPLEMENT OF DESIGNS.











THE WATCHMAKER JEWELLER AND SILVERSMITH

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*All need the beautiful—
Few can produce it.—GOETHE.*

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MAY 5, 1885.

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ILLUSTRATED SUPPLEMENT:—"Designs for Modern Jewellery."

International Inventions Exhibition.

THE Exhibition was opened on Monday, May 4th, by his Royal Highness the Prince of Wales. The following exhibits will be of special interest to the readers of this journal:—

American Watch Co. (The), Waltham, Mass., U.S.A.; and Waltham-buildings, Holborn-circus, London, E.C.—)1) Machinery for making different parts of watches. (Male and female operatives at work.) (2) Case containing parts of watches. (3) Model of the factory. (4) Show-case with 1,000 finished gold and silver watches.

Frodsham & Co., 31, Gracechurch-street, London, E.C.—(1) Chronometers. (2) Watches. (3) Clocks. (4) Marine and pocket chronometers. (5) Fusee and going-barrel keyless watches in various stages of manufacture.

Benson, James William, 62 and 64, Ludgate-hill, London, E.C.—The patent dust and damp excluding band for watches.

Grimshaw & Baxter, 33 and 35, Goswell-road, London, E.C.—(1) Clock and watchmakers' tools and materials: Combined lathes, wheel-cutting engines for flat and keyless work; machine tools for jewel-setting, uprighting, fraising, and sinking, as used by manufacturers of watches on the interchangeable system. (2) Lathes and mandrils, as used by telegraph instrument constructors.

Goldsmiths' and Silversmiths' Company (Manufacturing), 112, Regent-street, London, W. (Manufactories: Clerkenwell, Sheffield and Belfast).—Improvements in diamond cutting and polishing, and the manufacture of gem and gold jewellery, sterling silver and electro plate, watches and clocks.

Dent, E., & Co., 61, Strand, London, W.C.—(1) Improved ship's compasses. (2) Uniform pressure clock. (3) Astronomical clock with galvanic contact apparatus for dropping a time ball. (4) New compensation pendulum. (5) Small galvanic chronograph. (6) Chronometer with galvanic contact apparatus. (7) Watches with improved lever escapement. (8) Improved small turret clock. (9) Detached pieces of machine-made clock work.

Bailey, W. H., & Co., Albion Works, Salford, Manchester.—Bailey's improved turret clock.

Wycherley, Hewitt, & Co., Warrington-road and Scotch-lane, Prescot, Lancashire.—Watch movements on the gauge and duplicate system, and complete set of improved watch barrel-making machinery.

Kew Committee of the Royal Society (The), The Kew Observatory, Richmond, Surrey.—Forms and papers illustrating the methods employed at the Kew Observatory, Richmond, in examining, rating, and certifying as to the performance of watches, pocket chronometers and chronograph, for the manufacturers and general public.

Walker, John, 77, Cornhill; and 230, Regent Street, London, W.—(1) Railway guards, crystal case, aquatic alarm, repeating and chronograph watches and chronometers. (2) Chiming and other clocks.

Haswell & Sons, 49, Spencer-street, Clerkenwell, London, E.C.—(1) Improved watch and clock-making tools. (2) Watch and chronometer balance springs in alloy and palladium. (3) Special keyless appliances. (4) Varieties in watch and chronometer hands.

Rowley, A. & H., 180, Gray's Inn-road, London, W.C.—(1) Large chiming clock with newly invented automatic figure work and perpetual calendar. (2) Clock with improved chiming on bells and gongs in newly designed Gothic oak case. (3) Lever clock, striking the ship's bells, including the dog watch. (4) Parts of clocks showing the stages of manufacture. (5) Various chiming and other clocks, with all the most modern improvements. (6) Two very old clocks with crown wheel escapements.

Smith, J. & Sons, 18, St. John-square, Clerkenwell, London, E.C.—Improvements in electric time bells, chime and other clocks.

Samper, M., & Co., 30, Rue Folie-Mericourt, Paris; and 1, Holborn-circus, London, E.C.—Patent eight-day alarums.

De Gruyter Clock Manufacturing Co. (The) ,147A, Aldersgate-street, London, E.C.—Warder's patent torsion pendulum 400-day clock; requires winding once a year.

Bendon, Geo., & Co., 36 and 37, Ely-place, and 1, Charterhouse-street, London, E.C.—Keyless clock.

Firth, N. C., 125, Foregate-street, Chester.—Workmen's patent automatic time-checking clock.

Millar, John, Bethnal-house, Cambridge-road, London, E.—Tell-tale clock for asylums, &c.

Lange, Christian, 23, Great Portland-street, London, W.—(1) Winding construction for keyless watches. (2) Gravity escapement for church clocks and regulators. (3) Improvements in keyless and other watches, thereby dispensing with the bow and making it more convenient to wind.

Society Chronos. (Mayrhofer & Otto), 11, Abchurch-lane, London, E.C.—Anti-Electro-hydro-Pneumatic clocks.

Sage, Frederick, 80-84, Gray's Inn-road, London, W.C.—Workmen's time check.

Levy & Lowe, Hazeldean, Knighton, Leicester—Workmen's time recorder, for automatically registering the exact time of arrival and departure of operatives and others.

Hanson, L. & Co., Dean Clough Clock Works, Halifax.—Patent self-acting timekeeper.

British Horological Institute (The) Northampton-square, London, E.C.—Contributions from Members of the Institute as follows:—R. Bridgman, poising and other tools; D. Buckney, fine watches and interchangeable parts; W. Barnsdale, various types of clocks; H. Cousens, patent dials for 24-hour clocks; Corke Bros., specimens of watch-case engraving; W. W. Chalfont, inventions connected with watchwork; L. Donne, fine watches; J. Greenwood & Co., machine-made clock movements; J. Hammersley, fine watches and watch springs; G. H. Harwood, specimens of watch-case making; H. P. Isaac, watches and chronometers; S. Jackson, anglemeter for lever escapements; T. Mercer, chronometer clocks, chronometers and balance; J. Meek, model of two-pin escapement; Nicole & Co., watch springs, chronographs, &c.; J. Player, improved click for going-barrel ratchet; W. G. Schoof, chronometer with 5-tooth resilient lever escapement; J. Tripplin, models of escapements and trade literature; T. D. Wright, anti-magnetic watch; watchwork in various stages executed by Students of the Institute.

Standard Time and Telephone Co., Limited (The) 19 and 21, Queen Victoria-street, London, E.C.—(1) Standard regulator. (2) Synchronised clocks. (3) Clock fitted with contact springs to ring a series of electric bells at any stated times. (4) Hourly flashing signal.

Webster, R. G., 5, Queen Victoria-street, London, E.C.—Improvements and inventions in clocks and watches.

Matheson, J. S., Leith, N.B.,—Keyless Chronometer.

English Watch Co., Limited (The), Villa-street, Birmingham.—(1) Improvements in design and construction of minute-recording chronographs, chrono-micrometer. (2) Improvements in design and construction of railway-guards' and other machine-made watches.

Kendal & Dent, 106, Cheapside, London, E.C.—(1) Watches for the use of the blind. (2) Watches with two separate dials, showing independently both the 12 o'clock and the 24 o'clock system of reckoning time with one movement only. (3) Watches showing the two systems of 12 and 24 o'clock on the same dial by the use of the elongated hour hand. (4) Watches with oxidized cases for the use of mariners and others. (5) Watches to measure distances by sound. (6) Chronometer movement with escapement in sight. (7) Lever movement with escapement in sight. (8) Horizontal or cylinder movement with escapement in sight. (9) Clock with triangle shape showing on two separate dials the two systems of 12 and 24 o'clock. (10) Clock with self-changing dial on the 24 o'clock system, obviating the necessity of having more than 12 figures on dial at one time.

Hills, J. F., Post Office, Sudbury, Suffolk.—An English keyless lever watch, with a specially designed dial, showing the code letters, for the use and convenience of postmasters and telegraphists.

Harrington, J., Carmel House, Leamington.—Chime clocks.

Squire, R., 37, Myddelton-square, London, E.C.—(1) Dust-proof and waterproof watches. (2) Improved watch movement, having [*a*] new isochronal hair-spring stud, [*b*] removable going barrel, [*c*] improved size of barrel to allow of an inappreciable variation in the force of the mainspring during 24 hours, and to reduce the risk of breakage of the spring.

Moore, George, 35, Cressingham-road, Lewisham, Kent.—Electric alarm attachment for clocks. The exhibit shows an eight-day mantel clock with the attachment on, and arranged with the switch, battery, and bell, connected up, showing an application of the patent in practical working order.

Camerer, Kuss, & Co., 56, New Oxford-street, London, W.C.; Manufactory: 2, Broad-street, Bloomsbury, W.C.—(1) Chime, watchman's tell-tale. (2) Regulator trumpeter. (3) Singing bird. (4) Cuckoo clocks, &c.

Kullberg, Victor, 105, Liverpool-road, Islington, London, N.—(1) Improvements in marine chronometers, viz: balances, elastic suspensions and galvanic mechanism. (2) Improvements in watches, construction of same, keyless mechanisms, &c. (3) Gas governor for maintaining uniform temperature.

Hancock & Co., 39 Bruton-street, New Bond-street, London, W.—(1) Manufacture of Jewellery. (2) Silver Plate. (3) Jewellery and precious stones.

Giuliano, Carlo, 115, Piccadilly, London, W.—(1) The introduction of open Arabesque work in gold and enamel. (2) Adopting the cutting of the stone in the natural form of its crystal.

Hirst, Bros., 13, Arlington-street, Myddleton-square, Clerkenwell, London, E.C.—Automatic-closing and double-snapping bracelet.

Warner, Mrs., 7, Pelham-place, South Kensington, London, S.W.—Galactoid.

Waldemar, Lund, & Co., 91a, Hatton Garden, London, E.C.—Aureburnean manufacture of shirt studs, collar studs and solitaires, in plain and engraved gold and real stones.

Jones, G., & Sons, 62, St. Paul's Churchyard, E.C.; and 368, Holloway-road, London, N.—Patent safety bracelet snap.

West, William, 42, Caroline-road, Birmingham.—(1) Improvements in solitaires and other dress fastenings. (2) Improvements in bracelet fastenings. (3) Improved scarf ring. (4) Improvements in brooch fastenings. (5) Improved sleeve links.

Aberlin, H. W., 178, Regent-street, W.—Improvements in clasps and rings for neckties and scarves; also tie retainer for white ties or any narrow tie; also for sailors' knots and pin scarves

Hirst, Godfrey, 1, Cleveland-villas, Whitby.—A new and improved method of manufacturing jet ornaments.

Gray, E., & Son, 47, Clerkenwell-green, London, E.C.—(1) Improved flatting mills for goldsmiths and jewellers. (2) Silent running lathes for scratch-brushing and polishing.

Parkes, A. E., 46, Warstone-lane, Birmingham.—An alloy of black silver for inlaying purposes, to supersede Niellowork.

Tree, J. J., 38, Jewin-street, London, E.C.—Special features of utility and novelty in collar studs, shirt studs, solitaires, bracelets, brooches, watch keys and pencil cases.

Baume & Co., 21, Hatton-garden, London, E.C. (and at Geneva, Les Bois, and Longines).—(1) Horizontal and Lever watches, both for keys and keyless. (2) Three-quarter plate keyless watches, adjusted for all climates. (3) Chronometers. (4) Repeating watches. (5) The new Longines watches and chronometers.

Cransaz, Professor T., Horological School, Geneva.—(1) Balances for marine watches. (2) Watches.

Diacon, T. J., Fils, Terraux de Chantepoulet 11, Geneva.—(1) Watches. (2) Repeating watches. (3) Movements and details.

Goy and Blanc, Geneva.—Improved chronometers, marking one-fifth of a second.

L'Hullier, Léon, Geneva.—(1) Watches. (2) Speciality in small watches for travelling.

Patek, Philippe & Co., Geneva.—Inventions and improvements connected with watches and chronometers.

Stauffer, Son, & Co., La Chaux de fonds.—(1) Watches and chronometers. (2) Repeating watches and other forms.

Weidemann, Geneva.—Watches, chronometers, movements and details.

Amsler-Laffon, Professor T., Schaffhausen.—Planimeters and integrators.

Langdorff & Fils, Geneva.—Musical boxes.

Perrelet & Co., Geneva.—Musical boxes.

Perrilat, —, Geneva.—Musical boxes.

Karrer & Wohnlich, Teufenthal.—Musical boxes.

Légé, A., & Co., 79, Turnmill-street, Clerkenwell, London, E.C.—Clock movements, and the detached pieces thereof during the different stages of progress; new compensated seconds pendulum.

Polytechnic School of Practical Watch and Clock-making.—(1) The trinograph [J. Herrmann's Patent], a tool for setting off angles and distances, applicable to watch manufacturing on the interchangeable system. (2) The graphical quadrant, a tool for setting out the calibre of clocks and other instruments. (3) Specimens of work and tools for manufacturing watches on the interchangeable principle.

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The American Watch Company petitioned the Massachusetts Legislature at the commencement of the session for a change of corporate name to that of the American Waltham Watch Company, and the latter asked permission to increase the capital stock of the Company, which is now 1,500,000 to 4,000,000 dols. The Legislature, having by a special committee carefully investigated the business of the Company, passed the bills granting the petitions of the Company, so that the capital stock will immediately be increased in accordance with the privilege granted.

Conclusively, the art of jewellers' window dressing is pretty well understood at Manchester. I have been much interested at the way this is managed in the windows of Messrs. Batty & Sons there. They have two establishments; one in Market Street, and another in Cross Street, and it is hard to decide which of them makes the best exhibition, for each is worth far more than a passing notice, and any of our friends would do well to take a good look at them when in Manchester. I am afraid that I cannot do them justice in this short notice, for my inexorable Editor does not allow me to indulge in rhapsodies during business hours.

Adjusted Keyless Watches.

(Concluded.)

If I have succeeded in enlisting the reader's interest in my previous paper, and that he has set to work in good earnest to make an adjusted watch, I shall have no difficulty whatever in retaining it, because there is nothing in watchmaking that is so interesting as the building up of a first class watch; the pleasure increases at every step, and when you get a watch to go nearly perfect, it is, to say the least, a grand achievement, and more than an equivalent for all the horological drawbacks. However, before we go any further let us take a sober view of the question lest we should mislead an amateur in this business of adjusted watches. Let us suppose the first attempt fails to secure a first, second, or even a third class certificate at the Kew Observatory, and it cannot be worse than this; he will then have only to correct the slight mistakes that are clear and evident in the watch he possesses; and though it will not be worthy the name high class it will be worth every shilling that it cost, and therefore it will be a profitable and instructive experiment.

Having carefully looked through the movement the next step is to stamp a number on the pillar plate, and then send it to the dial maker to have the dial made. The dial feet holes in Nicole & Co.'s movement are drilled off interchangeably, so that the dial maker can make them economically in large quantities, and also save time in manufacturing the watch. The compensation balance (which should go inside the barrel, a larger diameter is objectionable,) may be procured with the movement; this being done, it is ready for the one the most important part of the watch, viz., the escapement. Be careful to make this as correct as possible. In a fourteen size movement the wheel and pallets should not exceed a six size. The calliper of the movement referred to is admirably adapted to a small escapement, which may be sunk into the plate without coming in contact with the bar screws or steady pins. The jewelling, especially the balance staff holes, should be of good quality. Shallow holes, opened back and front, perfectly round and highly polished, give the best results. An adjusted lever watch cannot be manufactured with economy by one who does not thoroughly understand all the minutiæ of the lever escapement.

Immediately the escapement is made, you may fit the mainspring and jewel the third and fourth wheel holes. Before the case is made, or any of the polishing up is done, it is advisable to spring and time the movement in the grey, for the following reasons:—It prevents an unnecessary expenditure of capital; it may take three months to spring and adjust the movement, and the case would be lying idle all that time. It saves time, not having to put the movement in and out of the case each time you have to make an alteration. It prevents the liability of any of the polished work being defaced, and enables you to send out your watch without a mark on it.

Before you commence to spring the movement complete the motion work, fit the hands, and make a most careful examination of the entire movement. Report says that when the elder Brequet had completed a watch he first gave it to one of his best workmen to examine, correct, and give a report. This being done he gave it to a second workman to do likewise. After this he very carefully examined the watch himself. Without recommending a system so expensive, I may here state that it would be much more economical to have the movement three times examined than to commence springing the watch, as I have often seen done without a careful examination. Of course it is not possible in this short article to give a detailed account of the process of springing a watch, and as so many admirable works have been published on this subject it is unnecessary. But should the reader experience any difficulty the writer will be happy to give any information with regard to tools, materials, and methods employed in this part of our art.

I would that this business of adjusted watches was more generally and thoroughly understood; it ought long ago to have formed part of the curriculum of every watch jobber, and I know of no better way of thoroughly comprehending and mastering the whole subject than to make an adjusted watch. You may read all that has been written upon this somewhat obscure branch of mechanical science from the examination of Arnold and Earnshaw before a committee appointed by Parliament to enquire into their methods of springing and adjusting chronometers down to the last book that has been written upon the subject, and thereby gain much valuable information; but when you sit down to the board it will be found necessary to possess a large amount of cunning and skill in your right hand.

The delicate touches necessary in final adjustment are acquired by long and careful practise. In these days we hear a great deal of talk about watchmaking by machinery. You may believe me machinery can help you but little in this department.

When you have succeeded in obtaining a first-class certificate at Kew your confidence and doubtless your knowledge of watchmaking will have greatly increased, and it may be turned to profitable account in manufacturing not only the ordinary adjusted keyless watches, but you may try your hand at making complicated work also. A very large proportion of this kind of work is still done in London, but we are still dependant upon Switzerland for the movements of chronographs, repeaters, perpetual calendars, clock watches, and such like. The productions of the house of Nicole & Co., in these departments of our business, are all that can be desired.

(Concluded.)

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Diamonds and their History.

By James A. Forster.

(Reprinted from "The Journal of Microscopy and Natural Science.")

THE diamond was probably not known in Europe before direct intercourse with the nations of Southern India had been brought about by the Macedonian conquests. It is not mentioned by Theophrastus in his list of gems. The first indisputable mention of the Adamas as the true diamond, writes Mr. King, "is by Manilius, a poet of the latter part of the Augustan age, who describes its most striking characters, minute size, and enormous value."

There can, I think, be little doubt that the old writers frequently confounded, under the name of Adamas, the diamond with the sapphire, chrysoberyl, zircon, &c.; but, to again quote from Mr. King, "It is impossible to mistake Pliny's true meaning, especially if attention is paid to the admirably chosen comparisons exemplifying the characters of the gem." King then gives a translation of Pliny's description of the Indian diamond as follows;—"It appears to have a certain affinity to crystal, being colourless and transparent, having six angles, polished faces, and terminating like a pyramid in a sharp point, also pointed at the opposite extremities, as though two whipping-tops were joined together by their broadest ends."

The only diamonds known to the Romans were of small size (from the descriptions handed down to us, probably not above 3 carats' weight), and as they possessed no means of cutting or polishing them, were mounted in their natural forms, many of which are easily recognised from Pliny's descriptions of them under the names denoting from whence they came, as Ethiopian, Macedonian, Arabian. He also describes very accurately the cubic crystal under the name of Androdamas, and the spherical form as Cenchros. In all, Pliny divides his Adamas into six kinds, four of which certainly seem to have been the true diamond, and two (which he himself rejected as not possessing the qualities of the true Adamas) would appear to have been pale and inferior sapphires: these he styled respectively "Cyprian and Siderites," and stated that they exceeded the others in weight, which is conclusive proof that they were different minerals.

As the Romans were unable to develop the beauty of the stone by cutting and polishing, they probably esteemed and wore the diamond rather as a talisman than as a jewel, and were attracted to it by the supernatural virtues attributed to it by the Indians, who have always regarded it with peculiar, and frequently with religious, veneration. This has been forcibly depicted in Wilkie Collins's novel of the "Moonstone," which does not, I believe, at all exaggerate the feeling of reverence that Indians have for many of the remarkable and historic diamonds; stones that have, indeed, played most important parts in the history of their country and princes. Most notable among such stones is our own Koh-i-noor which the Hindoos consider to possess a genius of "good luck," and also the power of bringing mischief and ruin on those who possess themselves of it by fraud or force; and in confirmation of this they cite the remarkable history of the stone. Indian tradition traces it from the year 57 B.C., when it belonged to Bikramajeet, Rajah of Milwa, where it remained a crown jewel for ages. It then passed into the possession of the Moguls at Delhi, resting there until the last inroad of the Tartars under Nadir Shah, who, on reinstating his Tartar kinsman on the throne of Delhi, kept the diamond for himself. The tale runs that the stone was mounted in the turban wore by the king of Delhi, and on taking leave of him, Nadir Shah, as a mark of friendship, insisted on changing turbans. In any case, it went back with the great conqueror to Persia, with all the fabulous wealth accumulated by the Persian host. On the break up of his empire after Nadir Shah's death, the Koh-i-noor became the property of Ahmed Shah, king of Afghanistan, as the price of assistance rendered by him to the king of Persia. The gem from that time is very conspicuous in the history of the Afghan princes —always the symbol of power, continually the incentive to treachery and robbery, until it went into exile with Shah Soujah, who, hunted from Peshawur to Cashmere, fell into the hands of Runjeet Sing, the lion of the Punjaub; he, while professing friendship to the unfortunate Dooranee prince, took the opportunity to despoil him of his treasure diamond. It descended to Runjeet's successors, who retained it till the Sikhs were finally overthrown in 1849 by England, when this fateful gem, the talismen of Indian sway, passed into the hands of the East India Company, who presented it in 1850 to Queen Victoria. Since then it has been re-cut, but unfortunately in such an injudicious manner as to destoy to a large extent its beauty, the stone, in order to preserve its size, having been cut too thin for it to have the lustre and brilliancy inherent to its pure and beautiful material, which is perfection. However, with the disappearance of its ancient Indian form, its baleful influence, we may hope, has also passed away, and that it will henceforth remain an interesting jewel in the British regalia.

In the middle ages, the diamond had come to be valued and to hold the foremost place as a gem for its beauty as well as for the mystic qualities which superstition assigned to it. Principal among these was the power to counteract poison, to ward off insanity, and to inspire courage; further, the Italians attributed to it the power of maintaining affection between husband and wife, for which quality they named it "Pietra della Reconciliazione," and on this account it was used as the most appropriate for a betrothal ring.

The Mediævalist workmen, in their scorn for the impossible and love of surmounting difficulties, early endeavoured to overcome the indomitable hardness and irrefragability of the diamond, and thereby to discover some means of cutting and polishing it the same as other stones. Chemists likewise set to work to discover its nature and to speculate on its origin. The consequent experiments soon bore fruit, and in 1475 Louics de Berquem of Bruges was able to cut three large diamonds for Charles the Bold. Berquem's invention consisted in the discovery that the diamond could be polished by means of its own dust, and consequently could be ground away. His appliances were, however, as may be supposed, very inadequate for the task he undertook, and he succeeded in doing but little beyond polishing the natural facets of the crystal, and so developing its brilliancy; succeeding lapidaries, however, improved and perfected his method. About the end of the 16th century, the art made great progress, and in the beginning of the 17th century the possibility of cleaving the diamond was discovered. This discovery was the most important step till then made towards a thorough knowledge of the diamond, but it was not until more than a century after that its full value was recognised. I shall refer, further on, more fully to this cleaving, but may here state that the diamond-cutters of the 17th century found they could split a diamond crystal in certain directions, which can be done as easily and with as much certainty as one can split a piece of slate, and availed themselves of this to divide a stone as might be requisite for the improving of its shape or the removal of defects. Scientific men, on their side, had not been idle, and throughout the 17th century experiments were made by French and Italian chemists as to the effect of heat on the diamond, but without result, and it was left for our own illustrious philosopher, Sir Isaac Newton, to indicate for the first time the true nature of the diamond.

Newton, in his investigation of the refraction of light by transparent bodies, found that those that are uninflammable refract light nearly in the ratio of their density, while those that are inflammable have refractive powers that are greater than their density. And as the diamond has a very high refractive power and a comparatively low density, he concluded that it was combustible—a fact soon to be proved, and he went still further, and wrote that probably it was an "unctuous substance coagulated." By unctuous substance, he meant such as camphor, spirit of turpentine, gums, &c. At a latter period, Brewster still further established the connection between a high degree of inflammability and a great refractive force, by the high refractive power he detected in phosphorus.

Towards the end of the 17th century, Boyle, as predicted by Newton, demonstrated that under excessive heat the diamond disappeared. A little later, in 1694, a diamond was destroyed at Florence by means of a "burning glass," and the spectators saw with wonder it first become smaller and then entirely disappear, under the action of the rays of the sun. It was not, however, till nearly a century afterwards that the investigation of the nature of the diamond by the aid of heat was seriously prosecuted. In 1771, before a distinguished company of *savants*, Macquer burnt a fine diamond in his laboratory in Paris. Immediately a great amount of discussion arose, some experts maintaining that fire had no effect on the diamond; amongst the most notable was M. Blanc, a celebrated jeweller of Paris, who to prove his assertion, proposed to submit a diamond to the heat of a furnace for three hours. This experiment was performed in the laboratory of a chemist named Rouelle, and attracted a large number of men of science and jewellers. The stone was placed in a crucible, which was filled with lime, and submitted to the fire, and Blanc had to return home without his diamond, much to the delight of the *savants*. After this, a clever lapidary of the name of Maillard came to the rescue of his *confrère*, and offered to submit three diamonds to any fire, and for any length of time. This challenge being accepted, Maillard placed his diamonds in the bowl of a clay tobacco-pipe, covered them up with charcoal-dust, so as to exclude air, closed the top of the bowl with an iron cover, and placed it in a crucible filled with powdered chalk. This was submitted to such a heat that at the end of four hours the crucible had become a vitrified mass. The fire was then stopped, and on the mass cooling, Maillard, amidst the jokes of the spectators, who recommended him to look up the chimney for his diamonds, broke open the crucible, and there in the centre was the tobacco-pipe, with its charcoal and diamonds intact. The result of this experiment proved that, while the diamond disappeared when subjected to a great heat in the presence of air, it resisted the utmost heat that could be applied if air was completely excluded. Once this fact was established, the final solution of the problem of the analysis of the diamond could not long be delayed, and soon Lavoisier in France, and Sir Humphrey Davy in England, answered, each in his way, the question of "What is the Diamond?" Lavoisier succeeded in burning a diamond in an atmosphere of oxygen over mercury by means of a burning lens, and established by the presence of carbonic acid after the combustion, that carbon was one of the elements of the diamond. Davy went still further, and showed that as the combustion of a diamond in an atmosphere of oxygen gave rise to nothing else than carbonic acid or carbonic oxide, the diamond consisted simply of carbon in a state of absolute purity. In fact, it was that element crystallised, and the diamond had at length yielded to the chemist the secret of its nature, as its form and hardness had yielded to the patience of the lapidary. The diamond was conquered, and much of the mystery enveloping it dispelled, but there yet remained to be discovered its origin and true geological position. Before, however, entering upon this question, it will be well to consider carefully the diamond as a mineral, and to make ourselves acquainted with its form and characteristics.

The diamond belongs to the tesseral or cubic system, having three axes at right angles, and occurs in many different forms and appearances. So dissimilar, indeed, are some specimens from the normal type, that the uninitiated would hardly suppose they could be the same substance. It is found as crystals of various shapes and of every colour, also in more or less crystalline masses of no special or definite form. This variety is known as bort, and is of no use as a gem, being so flawed and knotted in its formation as to be almost, or quite, opaque. It has, however, its value, being of great importance in the arts and for mechanical purposes. Besides the crystallised forms, there is an exceedingly curious and interesting variety, almost amorphous, that is called carbonate occurring in broken pieces, opaque, black, reddish, or grey, and very rarely showing traces of crystalline structure. In appearance it is much like broken chips of hæmatite; of course, it is identical, chemically, with the crystalline diamond, but excepting its supreme hardness, it posseses little to remind one of a diamond. The carbonate is found only in Brazil, and is much valued and employed for engineering purposes, especially for rock-boring, for which purpose it is preferable to the crystallised diamond, being less liable to split when subjected to great pressure or concussion.

It would be impossible, in the limits of this paper, to describe the various uses made of bort and carbonate, but their importance will be indicated by the fact that selected pieces are mounted as turning-tools for the turning of chilled steel rollers, emery-wheels, stone, and such excessively hard substances as defy the finest chisels that can be manufactured, thus avoiding, to a large extent, the slow and laborious process of grinding by emery. It is also mounted on rollers for the purpose of dressing mill-stones, and perhaps most important of all, it is made, as stated above, into drills for rock-boring. These drills are composed of a steel ring, in the edge of which pieces of bort or carbon are embedded. The ring is fastened on to the end of a steel tube, which is made to revolve against the surface of the rock by steam power, and as the drill grinds into the rock, it is lengthened by screwing fresh steel tubes into the original one. Very deep borings (it is stated over 2,000 feet) can thus be effected very rapidly. A good tool will pierce hard granite at the rate of three inches per minute, and through so many thousand feet, without serious wear taking place. Of course, great pressure is required, and the diamonds have to be kept cool by the pumping of water through the tubes. The inferior kinds of diamond are also crushed to make diamond-powder, for which there is a large and increasing employment.

The diamond is usually described as crystallising in some half-dozen separate and different forms. This is certainly inaccurate, for, however dissimilar diamond-crystals may be in appearance (and an almost infinite variety of very beautiful and distinct forms occur), yet they are all reducible to the simple normal form of the regular octahedron, from which the most complex forms are built up according to a simple and definite law. Nature would seem to have done her utmost to puzzle the mineralogist with a multitude of beautiful geometric shapes, among which it is indeed difficult to know where to begin. We have a crystal of eight triangular sides, with sharp angles and straight edges, in form like two square pyramids, joined base to base; this is the regular octahedron; we have one of 6 sides, a perfect cube; another with curved edges and 24 sides; another with 12 sides; another of the shape of a cocked hat, having an irregular edge, this is a double crystal or twin. Some have their sides beautifully smooth and polished; others striated, or covered with little triangular pits, presenting a grey, semi-opaque appearance; some are coated with a dense colouring matter that appears to have entered into the outer layer of the crystal, and effectually prevents the interior being seen. Very frequently, a stone so coated, and appearing, when found, deep green and semi-transparent, on being cut produces a fine brilliant of the purest white. These regular forms are, however, comparatively rare, as by far the greater part of the diamonds found are broken chips and fragments of every possible shape. All this multitude of different shapes are, however, as stated above, derived or built up from one normal form, the regular octahedron. The question will be asked, "Why should the octahedron be considered the normal form more than any other—say the cube?" The answer is, that the cube can be cleaved into the octahedron, but the octahedron cannot be cleaved into the cubic form. For this reason, that whatever is the shape of the diamond, the cleavage planes are always the same—viz., in four directions parallel to the four pairs of faces of the octahedron, and in no other direction is it possible to split a diamond. It consequently follows that in cleaving one can only produce faces of an octahedron. The process of cleaving might fairly be called unmaking a diamond, for as nature has built up the crystal layer upon layer, so the cleaver takes off layer after layer till he lays bare the original shape.

The diamond, being of the tesseral system of crystallisation, has consequently three equal axes intersecting each other at right angles, and around these three axes the ultimate carbon atoms that are to form the crystal, group themselves according to an invariable law, in triangular laminæ, resting at definite angles with the axes, and forming planes that are the planes of the octahedron; and it is only by laminæ laid on these octahedral faces that increase takes place. It is, therefore, evident that if additions are made to some faces of the original crystal and not to others, the shape of the crystal will be altered; also, if a series of laminæ, decreasing gradually in size, are piled up on the triangular faces of an octahedron, each face will be trisected, and the octahedron crystal changed into a crystal of 24 sides. So it is with all other forms; there all built up by additions to some or all of the original faces of the octahedron.

I have spoken continually of cleaving, and should perhaps have explained the process before. First, a cleavage plane is found by examination of the surface-indications on the stone; then, having ascertained the directions in which it is possible to cleave the stone, the workman fixes it by means of cement on a handle. This he holds in his left hand, and with a sharp splinter of diamond, similarly fixed in a handle held in his right hand, he abrades on the diamond to be cleaved a small notch over the plane through which he intends to split. This done, he places the edge of a knife in the notch, and a gentle tap causes the diamond to separate. Although it is so easily split in this manner, yet a heavy blow from a hammer would probably fail to break it.

Having considered the outward form of the diamond, there remains its physical qualities to be investigated. First in importance is its hardness, which distinguishes it at once from any other stone. It is the hardest substance in nature, and can only be scratched by itself, while by it everything can easily be abraded. It is this quality of supreme hardness that gives the diamond its value to the engineer for rock-boring, the glazier for glass-cutting, the miller for dressing his mill-stones, and the lapidary for cutting other stones.

The specific gravity of the diamond is 3·55, being characteristically light (although so much harder, it is lighter than the sapphire). This, in conjunction with its great refractive power, as before stated, first led to the theory that it was combustible. Of its optical properties, I have not space in this paper to say more than that it refracts light more than any other gem, which quality, with its capacity, thanks to its hardness, of receiving the brightest possible polish, is the chief cause of its beauty as a jewel. When subjected to friction, it becomes highly electric, and after being exposed to the sun or to a galvanic current, it is said to show phosphoresence in the dark.

We have now to consider the occurrence and geological distribution of the diamond, more especially in South Africa, where for the first time in its history the diamond has been found in its parent rock.

The diamonds known to the ancients undoubtedly came from India, perhaps from the fabled mines of Golconda. These mines were really not situated at Golconda, but some distance from that place, which was merely the fort to which the produce of the mines was brought. In the 16th century, diamonds were energetically sought for in India. Of the actual mines there we know but little; the Portugal author, Garcias ab Herta, writing in 1565, gives some description of them, but his work is not of much scientific value, beyond establishing the fact that the diamonds were washed from a pebbly gravel. Tavernier, the French traveller, a century later, describes the Indian diamond-fields, many of which, he informs us, were then closed, and confirms the statement that the diamonds were either found in river-beds or washed from alluvial gravel. Recently, I gave a geological friend of mine who happened to be in India a commission to survey the old diamond district in the Madras Presidency, my firm then holding the concession for working it. He made the survey very carefully, and reported that the district had evidently been thoroughly worked out. The specimens of the gravels he sent me are very similar to those from Brazil. At present, very few diamonds are found in India, and scarcely any rough from there finds its way to Europe. On the contrary, large quantities of rough and cut Cape diamonds are sent to India by the London merchants. Borneo produces a few diamonds, but of the mines there we know nothing beyond that the district is said to be fearfully unhealthy, and that Europeans cannot live there. According to tradition, diamonds are said to have been found in Arabia, but this I believe to be entirely a myth. Mineralogical treatises also state that diamonds have been found in the Ural Mountains; however, I can find no satisfactory records of such finds, and it is certain none come from there now, and the asserted discoveries in California, Georgia, and Mexico are without foundation, and, like the reported finds of diamonds in Arizona, have, no doubt, resulted from "salting" operations by speculators who wished to sell a diamond-mine.

Australia has produced diamonds of small size, washed from the banks of the rivers, but only in such small quantities that they have not paid for the seeking, although it would seem probable, judging from our experience at the Cape, that districts rich in diamonds may be discovered in New South Wales.

(To be continued.)

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A PROUD Welsh squire took it into his head to be very angry with a poor curate who employed his leisure hours in mending clocks and watches, and actually applied to Dr. Shipley, Bishop of St. Asaph, with a formal complaint against him for impiously carrying on a trade. His lordship, having heard the complaint, told the squire he might depend upon it that the strictest justice should be done in the case. Accordingly the mechanic-divine was sent for a few days after, when the bishop demanded, "How dare you disgrace my diocese, sir, by becoming a mender of clocks and watches?" The poor curate, with all humility, replied, "To satisfy the wants of a wife and ten children." "That won't do with me," rejoined the prelate, "I'll inflict such a punishment on you as shall make you leave off your pitiful trade, I promise you;" and immediately calling in his secretary, ordered him to make out a presentation for the astonished curate to a living of at least £150 a year.

Correspondence.

To the Editor of the Watchmaker, Jeweller, and Silversmith.

Sir,—Considering the boldness of the assertion that is made in reference to this book ("The Text Book" for the City and Guilds of London Institute Examination in Watch and Clockmaking, by D. Glasgow) by its publishers, I think your correspondent, "Jobber," is fully justified in calling attention to it. He is also within the truth in what he does say, with a considerable margin to spare. It was my intention to claim the same liberty, and take up "Jobber's" and some other points, but by reason of pressure on my time, I am compelled to postpone doing so for another month at least. My connection with the examinations, for which this book pretends to be a text book, gives me the right to criticise it if there was no other, in addition to which the remarks of Sir Edmund Beckett in a contemporary, makes silence almost impossible on this matter.

I am, Sir, yours truly,
J. HERRMANN.

Polytechnic School of Watch and Clockmaking.

To the Editor of the Watchmaker, Jeweller, and Silversmith.

Sir,—*Re* Kew Observatory certificates.—I have read with interest some suggestions on the above in your last month's issue. May I be allowed to add that I think it would be an advantage to print the rate of the watch, which accompanies the Kew certificate, on a circular piece of thin paper, so that it could be fixed in the watch-case and accompany the watch in same way as the rate accompanies a ship's chronometer? If twelve equal spaces were ruled on the back of the rate paper, a monthly record of the going of the watch in the pocket might easily be made, and I think it would be a valuable record.

Yours truly,
HOROLOGIST.

To the Editor of the Watchmaker, Jeweller, and Silversmith.

Dear Sir,—Would you kindly inform me for what purpose the small springs are placed under the comb teeth in musical boxes, as I have experienced great difficulty in curing the squeaking sound that is very often found in boxes, which I was under the impression proceeded from the fly, or else has something to do with above mentioned springs. Your answer will greatly oblige,

Yours truly,
J. A. GOURLAY.

[Reply.]

Knowing by experience how very few persons are acquainted with the process of manufacturing musical boxes, moreover, the boxes which are returned to the manufacturers for repair bearing sufficient evidence of the ignorance of many of those persons to whose hands they have been committed previously for repairs, it might be interesting as well as profitable to buyers and repairers to give some few indications as to the mode of manufacturing them, and particularly the manner in which they may be repaired.

It frequently happens that a small defect may put a box out of service, the remedying of which may occasion a great loss of time to one not acquainted with the first notions of the construction of a musical box, but which can be repaired in a few moments by one knowing the theory and mechanism of the same. It is to attain this object that I will here give some idea of our manufacturing processes and some practical hints for repairing, hoping they may be explicit; if not, further explanation or amplifications will be cheerfully accorded. My intention is not to give a full description of *all* the manufacturing processes used in musical boxes. It would take too much space, and many of them would be of little interest or utility to workmen abroad. I will more particularly enter into details regarding those parts which have a close connection with the different accidents which may happen to musical boxes.

The manufacture of a musical box may be divided into two very distinct parts. The first includes all that concerns the mechanical part of a box—that is, wheels, pinions, barrel, spring, fly-wheel, &c., or, if I may use the term, the clock-work of the box. The second concerns more particularly the musical part of the box, viz.: putting the desired tunes on the cylinder, tuning the key-board, finishing these two parts and putting them in their proper places, so as to have a playing box. About the first part I will say nothing, everything concerning it having too great a resemblance to watches, and especially to clocks, for necessitating any further description here. Clocks and watches being universally found, and everywhere easily repaired, the case will be the same with the mechanism of a musical box. I will therefore proceed directly to the second part. For finishing an ordinary musical box, the following processes are necessary:

First—The tunes are pointed (*piqué*) on the cylinder. (Previous to this, of course, the choice of tunes is made, with the notes necessary for playing them.) This pointing is effected by an instrument in which the cylinder is placed on its two points. A needle, placed on a dial, serves to make the cylinder turn, in accordance with the measures of the music (tune), whilst the pointers (*pointeaux*) glide from one end of the cylinder to the other, making small dots on the cylinder in accordance with the notes of the tune.

Second—At each one of these dots a hole must be bored, of the same size as the steel pegs. This is made by a very simple boring machine especially adapted for the purpose.

Third—In each of these holes a steel-tempered peg must be placed, and all forced into the same height above the cylinder. The pegs are long enough to have a part in the inside of the cylinder.

Fourth—The cylinder is partly filled with gum (*mastic*), in order to fasten the steel pegs, and to give to the whole cylinder a certain consistency.

Fifth—The cylinder is put on a lathe, and, with a file, is turned, so as to give to all the pegs a flat summit, and to make them all of a perfectly cylindrical surface.

Sixth—The key-board must be turned in accordance with the note put on the cylinder.

Seventh—This key-board must be attached by screws to the plate of the musical box.

Eighth.—The ends of all the keys (*lames du clavier*) must be put in their right place, in respect to height (they must all be on a level), and with regard to the pegs of the cylinder.

Ninth—The key-board in place, each peg of the cylinder must be bent forward, so as to pass directly by the middle of the point of the key corresponding, and more or less bent, so as to allow the key to produce its sound at the right instant; a special instrument with dial and hands is here again necessary.

Tenth.—Steel spirals must be put at the end of each key, and bent in the right shape, so as to stop the vibration of the key each time a peg comes to lift it.

In the preceding description I have intentionally omitted several operations which are of no great consequence for a general comprehension. Before giving further details, I will make three preliminary remarks. The first is a precautionary suggestion, that great care should be taken never to take out any part of a box, except the key-board, without ascertaining whether the spring of the barrel is quite run down. It is easily understood that by lifting the keys of the key-board, if, for instance, the fly-wheel is removed, the spring being partly wound up, the cylinder, not being able to turn without the pegs attached to it, will revolve rapidly, and one of two things must happen, either the steel pegs of the cylinder will give way under the resistance of the key-board, and then break or be bent backwards, or, if the pegs be strong enough to resist, the key-board will be destroyed in pieces. Very often both cylinder and key-board may be broken in this way. Therefore, after having taken out the key-board, ascertain if the spring is at rest, and if not, let the box run down, and for more security, that no strain exists on the spring, lift the ratchet which hinders the spring from running backwards, and unwind it.

My second suggestion is: Before commencing to repair a box, observe at first if the pegs of the cylinder are all bent in the same direction, and if there be a few missing. If this be the case, there is all probability that the box need not be sent to the manufactory for repairs. But, if a certain number of pegs be wanting, or bent in all directions, especially backwards, no hope must be entertained of repairing the box, except at the manufactory itself, where all the particular tools are found necessary for making a musical box entire. In this way much expense may be avoided, and time and annoyance saved.

Thirdly, a very wrong impression is widely spread concerning the repairing of a musical box, which I will endeavour to correct. Very often a badly damaged key-board is alone sent to the manufacturer to be repaired or changed for a new one, or a new key-board is demanded to replace an old one, without sending back the whole box. In the actual state of manufacturing musical boxes, it is impossible to make a new key-board for a given cylinder, or the reverse—a new cylinder for a certain key-board—without having in hand the entire musical box. These two parts, which are the two most important of a box, are too closely connected to permit the mending of one without the other, or without the plate *(platine)* which carries them both. It is only when one or two keys are broken that it is possible to replace them without the entire box.

We have now given, in a brief way, an idea of the manner in which a musical box is made, and the indications when a box should be repaired at the manufacturer's, or elsewhere. We will now admit that the cylinder is in sufficiently good condition, and will mention, one after another, the accidents which may be easily repaired by any skilled workman, possessing ordinary tools.

Next to the cylinder, one of the most important parts of the musical box is the key-board. We will first see how all accidents happening to a key-board can be remedied.

It is well known that the number of vibrations of a pendulum in a given time, is regulated by the weight of the pendulum-ball. The heavier it is, the more slowly will it vibrate, and the lighter it is, the more quickly it will go. The same is to be found with the key of a key-board, which is nothing but the half of a tuning-fork.

The lower tones giving a less number of vibrations in a second than the higher ones, it will suffice to load the end of the key to lower the tone, and to lighten it to have a higher tone. It will also be easily understood that a thick key or a short one will vibrate more quickly than a thin or long one. After these suggestions, it will be very easy for any one to put any number of keys to the right tone.

Any person having had a key-board in hand, will have noticed that there are two kinds of keys; some having lead at the end, and others that have none. For those having lead, it will be sufficient to cut some of it to elevate the tone, and to file the key between the lead and the brass plot, to lower it. For those without lead, the same must be done to lower the tone, but having no lead, must be filed near the end underneath, to elevate it. As you must avoid having any thin keys (these not possessing good sound) instead of filing a key to lower it, it will be often preferable to change the lead for a heavier one, or supply the deficiency by solder.

We have now to see in what manner a missing tooth may be replaced. Take a piece of steel and make a key of the same shape as the missing one, or the adjacent ones, but on the under part a heel must be devised. In the steel block of the key-board, with a file of the width of the key, make a notch. Hammer the new key in its place, so that the heel will exactly fill the hollow space, and so that the key will be placed as much as possible in the right direction and right level. In making the new key, the point must be made a little longer and a little wider than the adjacent ones. Then temper the new key, draw it to a dark blue, so that it will vibrate like a good spring, and at the same time so that it can be filed. Whiten the heel of the key, put it in place, and solder it. This must be done with a soldering copper *(sor a souder)*, which weighs at least 6 or 8 pounds, so as to retain sufficient heat. Lay the copper pretty hot on the key when in its place, and after a few moments' delay the solder will run. The solder and acid are the same as used by tinmen. *(Soudere d'élain et eau a souder c'est a dire du zinc dissous dans de l'acide muriatique ou esprit de sel.)* The key, well fixed, must then be finished, filed on the top of a level with the other keys, and tuned by filing it underneath. It is necessary here to say in what way the under part of a key can be easily filed. Put in the vice a small block of steel or brass, a little thicker than the key is wide, about ¾ in. long, with a small elevation, lengthwise. Place the key to be filed on this block, the whole comb being held in the hand underside up, and with a certain pressure the key will rise above the others, and will be easily filed with a square file 3-16 inch wide, and 6 inch long. When the key to be filed is in the middle of a long key-board, it will be advantageous to make an appropriate handle to the key.

The point of the key must then be finished, that is, filed to its proper width (to correspond to the other points), and, at the same time, brought as nearly as possible to the same distance from the two adjacent points. For putting the point to its exact length, it would be well to hold the key-board with the keys perpendicularly on a piece of flat window-glass, and by reflection it will be easily seen when it is brought to the same length as the others.

Place the point of the key, when it is filed to the right width, as nearly as possible to its level, and proper distance from the adjacent ones. Sometimes it may be found necessary, however, to change the place of the point of a key; to lower it so as to put it on a level with the other ones, or to shift it to the right or left. In this case, a small anvil must be made, well tempered, of about the same shape as the one used for filing the keys, but quite flat on top, with no elevation. The hammer used must have one end tempered, with the end a little rounded and not too sharp. If a key is forged on the left angle it will move to the right and *vice versâ*. The key must be forged on the underside. Here a certain practice is quite necessary; the key must be well placed on the anvil, the place to be reforged resting well on it, and two or three strokes of the hammer will make the key move a little.

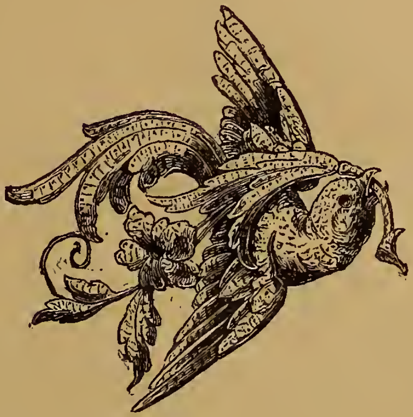
To lower or elevate a key, another anvil of the same size as the preceding one is necessary, tempered, but notched on the top. The key is laid lengthwise and quite flat on this anvil, and by striking the key with the other end of the hammer, which is flat and not tempered, the key will bend upwards. In both of these cases much care must be taken, as it is very easy to break a key in using this hammer.

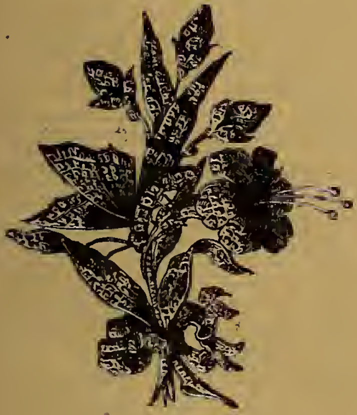
In case only a point of a key is broken it is not necessary to replace the whole key. With the blow-pipe *(chalumeare)* the end of the key must be untempered, but care must be taken that the flexible part of the key be not beaten and untempered (the sound would be lost); a small notch is made with a narrow file *(lime a entrer)*, and a small piece of spring filed and pressed in. It will be easily soldered with a small soldering copper. Then the point must be finished as already indicated.

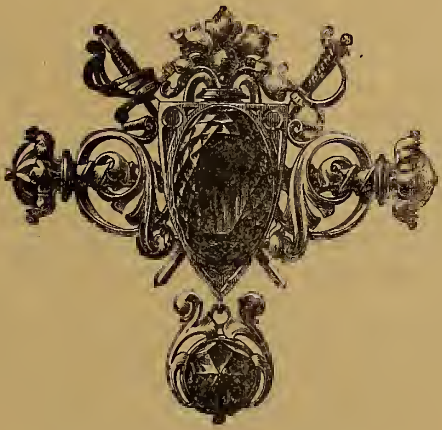
It may be well to remark here, that when a key is untempered and has no sound, it will sometimes regain sound by drawing it to a blue with the blow-pipe, without previously tempering it.

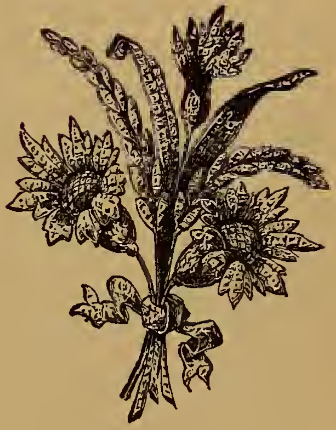
Now the whole key-board being complete, no keys or points missing, it must be put on the musical box-plate *(platine)*, and the line of small dots, which every cylinder carries, will serve to indicate if all the points of the key-board occupy their right places. This can also be seen by the pegs; when the cylinder turns the pegs must all come exactly under the middle of each point of the key-board. When it is ascertained that all the

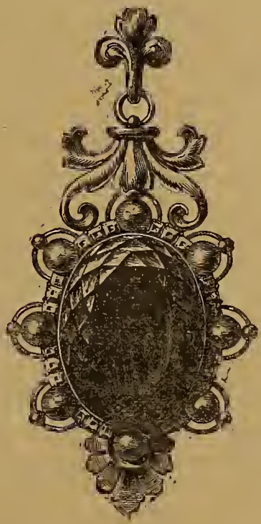
DESIGNS FOR MODERN JEWELLERY.











points are in their places, the key-board must be finished completely,—that is, all missing spirals replaced, and the key-board then definitely tuned.

The tuning must always be done twice, because all operations upon a key change its tone a little, even when a spiral is changed; and before hammering a key it must be brought to the proper thickness and about to its right tone. It may be advisable here to remark that in the first tuning it is well to leave the key half a tone too high, because by putting a spiral at its end lowers the tone, and in general it is easier to lower the tone than to elevate it.

There remains now only to be seen what form must be given to the spirals, how to put the key-board in its right place, and in general, how to have a good playing musical box.

The manner of repairing all defects in a musical box have now been indicated. The mechanical part now runs well, the key-board is repaired, tuned, and in good condition. Before indicating the form which must be given to the spirals of the key-board, and how to place the key-board itself in its right position, we offer the following suggestions.

The cylinder must be free to move easily up the six, eight, or ten tunes, as the case may be, and fall back readily to the first tune, being regulated by the spring (*boudin*) at the left end of the cylinder. But care must principally be taken that the axis of the cylinder (*tige du cylindre*) turns freely; but on the other hand, it must have no play whatever to move lengthwise between the two bridges (*ponts*). If the least play exists it will be utterly impossible to finish the box properly. The pegs of the cylinder must necessarily follow exactly under the points of the keys; if not, the box will never play well. If any play be found, it will easily be removed by bending the legs (*peids*) of one of the bridges (*ponts*) of the axis.

This done, the spirals of the key-board must be bent their right shape, and the key-board put in its proper place. I will, in a few words, describe the theory of the spiral, this being a very important part of the musical box. The manner in which these small steel stiflers (*étouffoirs*) are bent contributes very much toward making an excellent box. The upper side of the key-board must always make the same angle of the radius of the cylinder, passing through the point of the keys. This angle, *a b c*, must be 165 degrees, or, which is the same thing, angle *a b d*, equal to 15 degrees. It is not very easy to measure this angle, but in practice the following will amount to about the same results. Supposing the diameter of the cylinder to be 24 *lignes* (French foot) = 54 centim. = $2\frac{1}{8}$ inches) *a d* must be 7 *cm* ($\frac{1}{4}$ inch). It will be observed that the upper level of the key-board, *b c*, prolonged, will attain pretty exactly the summing of the spring (*boudin*) at the end of the cylinder. Supposing this to be the case, the spiral must have the shape magnified. The end of the spiral must be as near the point of the key as possible without touching it. It must be observed that the heavier a key is (or the lower the tone) the thicker must be the spiral, as it is more difficult to stop the vibrations of the key. As the cylinder turns, the peg will first touch the spiral at about the last third part the spiral will fall back, and when the peg has reached the end of the key, the vibrations of the key will have stopped. If the spiral is too thin the peg will readily pinch it (it must then be changed), and will not sufficiently stop the vibrations; or if too thick, the spiral itself will produce a buzzing noise in stopping the vibrations of the key. To see if the spiral has a good shape and works properly, it will be best to let the box play slowly, the key-board in its place, and examine how the pegs act on the spirals, and see that they do not get out of place. Some practice will be necessary here to find out if the spirals must be bent forward (when they do not sufficiently stop the vibrations), or backward (when they make too much noise, or are pinched). For bending these spirals a pair of pliers with a hook at each end will be necessary. It must not be forgotten that the shape and strength of the spiral, its distance from the end of the key, its place backward or forward, all have an importance which must not be overlooked.

The only thing remaining now is to put the key-board in its proper place. 1st. As to height. The dotted line which is found on each cylinder will here serve as a guide; but it must be observed that, supposing the shortest key to be on a level with the dots, the longest ones must be a little below, about the distance of half a dot. This difference in level gives the difference in "rise" of the keys, the longer ones necessitating more rise than the shorter ones. If this level should not be right, the key-board must be left as it is, and one of the bridges (*ponts du cylindre*) must be raised or lowered accordingly.

2nd. The key-board must occupy the right place, as to left and right. That is, all the pegs must pass directly in the centre of the points of the keys. It will facilitate matters to observe if the points of the keys pass at the same distance between the pegs of the two adjacent tunes. Should they not, the cylinder or the key-board must be shifted right or left; the key-board by bending the feet in the opposite direction, the barrel by filing or elevating the metal piece (*mentomet*) which rests on the tune counter (*ellipse*) placed on the inside of the toothed wheel of the cylinder.

3rd. A good rise must be given to the keys of the key-board. If they rise too little they will have but little sound, and if too much they will have a disagreeable sound; and, moreover, it will be difficult for the spirals to stop the vibrations, or they will make a noise and get pinched. At the same time it must be carefully examined if the different keys produce their sound at the same moment; that is, in those parts of the tune when it is easy to observe that they should. This will be easily seen by letting the box play slowly. When the sounds are produced too late, the part of the key-board where this occurs must be put a little backwards, and if too soon it must be put a little forwards. This is obtained by bending the feet (*pieds*) of the key-board in the opposite direction.

When the key-board is mended and tuned, it would be well to suggest that the spirals be bent only approximately, until after these last operations are completed, when the last touch must be given to the spirals, in order to obtain a musical box playing smoothly and agreeably.

After all this is done, it would be well to let the box play through all the tunes, and correct all the pegs that may have lost their right position, either right or left, by producing a disagreeable noise, by touching the end of the keys when they should not, or by playing too soon or too late. When they play too soon the pegs must be bent backwards, and when too late, forwards.

The case may happen that three or four tunes play quite well, and at the fifth one, for instance, all the pegs pass over the side of the ends of the keys. This will be corrected by touching that part of the counting wheel (*ellipse*) which gives the said tune.

Let us now resume, in a few words, the order in which all these different repairs are to be effected.

First, repair all concerning the mechanical part of the box, until, without the key-board, every wheel runs well. See that the axis of the cylinder has no play lengthwise, then that the cylinder moves freely on its axis. Repair all missing keys and points of the key-board, file the new keys half a tone too high, put all the points on a level and at the right distance from each other, place all the spirals, bend them appropriately, tune the keys definitely, put the key-board in its right place, finish the bending of the spirals to their proper shape, and then correct all pegs on the cylinder.

If often occurs when a musical box plays that the pleasure is destroyed by a continual buzzing noise, produced always by a piece of metal or wood not properly fastened. The best way to find out what part of the musical box produces this disturbing noise is to let the box stop, and make the keys resound from one end of the key-board to the other with a rounded point; the notes which cause this noise will soon be discovered, then continue with one hand to produce this sound, and at the same time with the other hand touch all possible parts of the box which seem to produce the noise, and as soon as, by touching, the noise ceases, the object has been discovered. Tightening the screw, or a drop of oil, will very often do away with the noise.

If I may hope to have given a sufficiently clear description of the musical box, at least in those parts which are most necessary for persons having to repair them, my object will have been obtained. I certainly cannot pretend to have explained all possible accidents which happen to musical boxes. Much more could be said about boxes with harmonium sounds, bells, drums, castanets, and also about boxes with changeable cylinders; but these certainly are a few in number, while the explanations I have given find their application in all kinds of boxes.

Any further suggestions which may be desired will be most cheerfully accorded, being well satisfied if I have contributed, in a small way, in securing to some persons the pleasure of having renewed a good musical box which had been put aside for want of good doctoring.

L. A. GROSCLAUDE.

Gem Cutting.

(Continued from Page 153.)

THE fortune which Bernardi found in his own country, his contemporary Matteo del Nassaro (about 1500-1550) sought in France, where Francis I. became his patron. His early life had been spent in Verona—his birthplace, Nassaro, being near that city. He was endowed with more than one talent, and masters were plentiful, Niccolò, Avanzi, and Galeazzo. Mondella taught him to draw and cut gems. Marco Carrà and the Marquis of Mantua's trumpeter instructed him in music. Chance after all directed which career he should follow. A beautiful piece of green jasper, spotted with red fell into his hands, and he made a large cameo of the "Deposition from the Cross," adding to the realism of the composition by cleverly bringing the red spots to mark the wounds. Isabella, Marchioness of Este, purchased it. Soon afterwards he was invited to the Court of France, where Francis I., delighted to find in one person a gem engraver and an accomplished lute player, took him into his own household, and pensioned him. It soon became the fashion for the courtiers to wear cameos or gems engraved by Nassaro, and his works multiplied fast. The finest of his cameos are a bust of Francis I., a battle scene on sardonyx, and a head of Dejanira on agate, of many colours, which he so made use of as to give the effect of natural tinting to the subject. He executed some marvellous intagli in rock crystal, one of which, a "Venus and Cupid," is exquisitely beautiful. He was a good artist in works of a larger scale; the king employed him to draw cartoons for tapestries, and he went to Flanders to superintend their manufacture. On the occasion of the defeat of Francis at the battle of Pavia, Nassaro returned to Verona, where he lived in a mountain cave with furniture and pictures from France and Belgium, but was not long allowed to enjoy it, for on King Francis's restoration, in 1526, he was peremptorily recalled to Paris, where he established a school of gem-engravers, and became the master of dies for the mint. His house was always open to Italians, and Benvemito Cellini speaks of having been invited to a party in Nassaro's garden.

Verona gave another famous gem-engraver to the world, viz., Giovanni Jacopo Caraglio, whom we have already mentioned as engraver of pictures on copper—an occupation he gave up, however, as being derogatory to his dignity. In 1539 he entered the service of Sigismund, King of Poland, for whom his finest gems and medallions were engraved.

Valerio dé Belli, called from his birthplace Valerio Vicentino (1479-1546), rose to still greater fame, and his principal works remained in Italy. In execution he equalled the finish of antique masters, but was so deficient in ideality that he generally availed himself of antique models or designs by other artists. He entered the service of Pope Clement VII., and, by his own works and the large number of his scholars and followers, gave a great impetus to the unique-cento revival of gem engraving. His masterpiece is a casket of rock crystal, which, after being made a present to King Francis I., by Pope Clement, again returned to the possession of the Medici, and is now in the cabinet of gems at the Uffizi. The casket, which is mounted in silver gilt, has eight squares of crystal intagli round it, one at the bottom and eleven in the cover, all worked most exquisitely and full of life, noble expression, and fine flow of drapery. The stories in the cover are:—1. "Supper in the Pharisee's House." 2. "Entrance into Jerusalem." 3. "Agony in the Garden." 4. "The Betrayal." 5. "Christ before Caiaphas." 6. "Before Pilate." 7. "The Flagellation." 8. "Bearing the Cross." 9. "Crucifixion." 10. "Mary Magdalen at the Sepulchre." 11. "Ascension." On the base:—1. "Nativity." 2. "Epiphany." 3. "Presentation." 4. "Dispute with the Doctors." 5. "St. John Baptizing Christ." 6. "Woman taken in Adultery." 7. "Cleansing the Temple." 8. "Resurrection of Lazarus." 9. (at the bottom of the casket) "The Entombment." On a frieze in the intagli is the name of Valerius de Bellis, vic, amo "MDXXXII." Between the intagli are small ovals, beautifully enamelled with the arms of the Pope and the Medici family. Inside is a small round urn, with a Phœnix on it, and the words, "Sic Morendo vita perennis," in smalto. It is thought the Pope ordered it for the Hast in the Easter services.

Valerius made an immense number of intagli in crystal, several vases, paterae, reliquaries, &c., some of which the Pope kept for his own use, and others he presentedto foreign princes. Many of the fine vases of agate, lapis lazuli, jasper, and carnelian in the cabinet of gems in the Uffizi are the work of Vicentino. They are given by Clement VII. to the Church of San Larenzo; but the Grand Duke Pietro Leopoldo provided other vases and reliquaries for the church, and placed there in the museum. Valerio made another series of intagli of subjects from the Passion, on a magnificent silver cross for Pope Paul III. Many of the gems he cut for that pontiff are still in the Vatican. The room of cameos in the Uffizi has a marvellous fine intaglio on white chalcedony, by Valerio, representing the "Marriage of Venus;" there are twelve figures, almost all classically draped, except Venus and Cupid.

Parma, too, had its gem workers—Francesco Marmita, who imitated very successfully the antique, and his son Lodovico, who is known by the fine cameo head of Socrates, now in the Uffizi, as well as the crystal intagli which he engraved for a silver casket presented by Cardinal Salviati to Leonora di Toledo, wife of the Grand Duke Cosimo I.

The cameo room in the Uffizi possesses the portraits of Leonora and Cosimo, with their children, in, perhaps, the largest cameo in the world—an onyx seven inches and a half in diameter. A winged genius of Victory, holding a torch, flies above the heads of the group, the centre was occupied by a picture of Florence let into a circle in the stone. This unique specimen of the two arts is now very much injured; the stone is broken, and the picture has vanished. The artist was said to be a Milanese, Giovanni Antonio de Rassi.

Marvellous as Vicentino's intagli were, he was surpassed by Alessandro Cesati, called "Il Grecco," who came nearer to Greek excellence than any other artist of his time. We have already spoken of his medals; the Dactyliotheca in the Uffizi has some of his cameos, one of which, a portrait-bust on carnelian, has the artist's name in Greek letters. Besides three smaller cameos, M. Mariette mentions a beautiful head of Phocian which is in the possession of his friend, Signor Zanelli, at Venice, and which he pronounces a perfect work in his "Memorie degli Intagliatore."

To Clemente Birago, a Milanese, who lived at the Court of Philipp II., of Spain, is due the having surmounted one of the chief difficulties of his art, the cutting of an intaglio in diamond. The invention has been attributed to Jacopo Trezzo, who was contemporary with Birago at the same court; but Mariette brings the testimony of the botanist Clusius, who wrote an account of his journey into Spain in 1564, and Paolo Lomazzo, a contempary and fellow-countryman of Birago, to prove that Clemente was the real author. Clemente Birago cut the arms of Spain on a diamond seal for the Infante, Don Carlos, and the portrait of the same prince on another diamond, as a present from Don Carlos to his *fiancée*, the Archduchess Anna.

Besides Birago, Milân boasted of several good intagliatori, among whom were Francesco Tortorino, famous for his cameos; and Giuliano for his intagli in crystals, and Annibale Fontana, who died, aged forty-seven, in 1587, and to whom William, Elector of Bavaria, paid six hundred scudi for a casket enriched with fine intagli on rock crystal.

The Genoese artist Pippo, or Filippo di Santa Croce, began life as a shepherd, and amused himself, while his flock fed in green pastures, by cutting little figures in relief in plum and cherry stones—figures almost microscopic, yet in good drawing and proportion. Some of these falling into the hands of Count Fillippino Doria, he took the shepherd-genius to Rome, and placed him under an artist. Pippo settled later in Genoa, and became father of a family of gem cutters. After the end of the sixteenth century, the art of intaglio languished in Italy; although Kaspar Lehmann and Lucas Kilian still kept it up in Germany, and Coldore in France.

The Italian taste became debased if we may judge from the specimens of this epoch in the cameo room. Instead of the exquisite "finezza" of art, the unique colour or quality of the stone seems to have become the object. Thus we have a large cameo on sardonyx of several strata, representing one of the wild beast fights which were held in the Piazza della Signoria between the fifteenth and eighteenth centuries. In this crowded subject a perspective is aimed at by the shading of the layers of the stone; the animals being dark, the arena and spectators in the background light.

There are in the same museum immense cameos of peacocks and grotesque subjects on variegated jaspers, and a really beautiful Venus cut in high relief on the pink layer of a rare stone, with some cupids holding a white veil behind her.

But perhaps the greatest cause of the decline of gem cutting in Florence, was the different purpose to which precious stones were dedicated in the Medici studio. The same love of rarity, which we have spoken of, led Cosimo I. and his successors to a lavish display of wealth of material. Tiny gems with the most delicate work of art on them, no longer contented the Medici magnificence; they must have larger objects. The same hand which could cut a cameo could shape a vase out of a single magnificent rare stone. The laboratory of cameists which Lorenzo had established in his house, grew to be a factory of priceless vases, and was known as the Casino di San Marco. Those beautiful chalices and salt-cellars of intagli on rock crystal, of sculptured lapis lazuli and agate adorned with chased gold and smalto and precious stones, which are preserved in the cabinet of gems in the Uffizi, were made there. Eighteen of the collection have the words *Laor. Med.* engraved on them; five of them are Oriental sardonyx, four red jasper, two amethyst, one yellow Sicilian jasper, one carnelian, one coloured jasper, one jasper di Grisons, and one petrified wood. These vases, with the crystal ones by Vicentino, spoken of above, were given by Clement III. (Lorenzo's nephew) to the Church of San Lorenzo, in 1533, to furnish the chapel which Michael Angelo designed.

One of the most beautiful objects in the cabinet of gems is a vase of jasper di Grisons, in form of a hydra, with a golden statuette of Hercules on it. There is also an elegant chalice of lapis lazuli, with handles, in the form of sphinxes; the sides are adorned with a cameo of Bacchus, and one of a satyr between two dolphins. The most elaborate and least beautiful is a triumphal column in rock crystal, about twenty-three inches high, the base being supported on six agate lions. The pillar is covered with a spiral of the most microscopic intagli, celebrating the wars and victories of Cosimo I., the base has six medallion intagli of portraits of the captaines and scenes from the life of Cosimo, all very crowded, tiny, and allegoric. The art is of the decline of the sixteenth century, so we may conclude it to be one of the last works produced in the Casino di San Marco. Not many artistic intagli were made there after that date, for Francesco I. turned the collection of precious marbles and agates to a different purpose, that of covering the interior of the Medici Chapel, and thus gave birth to the Florentine "lavori di commesso," or mosaic, as it is called in English.

From cutting cameos—which, by managing the different tints in the stones, should have the appearance of raised pictures—to really making flat paintings in marble was but a step. This is not, however, the place to trace the history of Florentine masaic, which chiefly had its rise in the seventeenth century, and does not come under consideration as a Renaissance Art.

Sixpenny Telegrams.

THE success or failure of this great reform in the telegraphic service will depend, we believe, on the way in which the authorities ultimately deal with the names and addresses of sender and receiver. As now proposed these are to be charged for as parts of the message, and to be included in the twelve words that are to be given for sixpence. If this plan is carried out, one of two things must generally happen. Either the names and addresses will be so cut down as to cause the post office endless trouble in delivery and to mislead the receivers by partial and confusing descriptions of their senders, or there will be very few words left for the message itself. Men of business can indeed say a good deal in four or five words, but the majority of mankind are not given to epigrams and cannot state so shortly what they mean. Then again this charging for addresses is an entirely new departure from the present practice as to inland telegrams, and this alone is a strong argument against it. What is wanted, as we conceive, is a compromise between the contending methods, and a plan which keeps as far as possible to that now in use should on that account be preferred. We would therefore suggest that 10 words should in every case be allowed for the addresses free, any words used beyond that to be charged for as part of the message. There are few cases in which the names and addresses of both sender and receiver could not well be comprised within 10 words, and these being allowed free, there would be no temptation to abbreviate unduly. We would then allow for the message

5 words for 6d. .. 15 words for 10d.
10 „ „ 8d. .. 20 „ „ 1s.

charging 2d. per line of five words after. The advantages of this plan are obvious. It keeps to the present scale of 20 words for a shilling and it fixes the rates by easy gradations. It would really be a reduction in telegrams, which the present proposal of the authorities is not, for 12 words at sixpence, to include both addresses, would often be little better than a delusion, leaving only two thirds upon an average for the message. People would therefore have to use more, and so spend eightpence or tenpence, thus leaving the sixpenny telegram, of which we have heard so much, as a mere name. It may be said that by adopting such a scale as that above suggested, the department would lose, and according to their calculations it is possible that there might be some loss at the beginning. But we think this argument has already been made too much of, and too generally admitted. The department exists only for the service of the public, and the wants of the public must be first considered. If we were to listen to officials we should never move in anything. Their natural instinct is to stand still, and they are always able to prove anything by figures. A real sixpenny telegram will be a great boon to thousands, but as proposed by the post office it would not be a reality, and that is why we offer these suggestions.—*Kemp's Mercantile Gazette.*

Out and About.

By P. Howard.

More fun!

With a Ring—A wedding bell(e).

Watches were first made in 1476.

The first of the family circle—The wedding ring.

Thermometers are about 250 years old, but they are still very unsteady in their habits.

Silver "Cock-a-doodle-doos" set in paste are the most fashionable brooches in Paris at present.

A young man said to Sophocles, "If you could coin all the silver in your hair, how rich, old man, you would be!" "Not half so rich as you would be, young man," answered Sophocles, "if you could only sell the brass in your face!"

The idea of presenting "six electro-plated teaspoons with each guinea gold wedding ring" is now getting played out rapidly. The newest bait is to give away a sterling silver thimble, and it is said to prove a much greater success than the spoons with the spoony ones.

The trade attraction at Leeds is the fine large clock and time ball of Mr. John Dyson, of 24, 25, and 26, Briggate (just below Boar Lane), in whose windows may be seen one of the finest provincial stocks of all the goods known to this trade of ours, and displayed with more than usual good taste.

There is a lady at Southport who wears a large diamond ring on each of her eight fingers whenever she is seen, whether at breakfast or by gaslight. She also wears diamonds in her hair, large solitaires in her ears, and bracelets and pins set with these rare jewels. She is suspected also of having anklets clasped with diamonds, as well as shoe buckles.

What could you wish more? Hesling & Co., tailors, 1, Albion Street, Leeds, are giving away "a real silver watch," which they say is "*warranted* by Fattorini" (Query: Fattorini & Sons, Bradford?) with every fifty shilling suit of clothes, made to measure! Now if they could only manage to add a two ounce, eighteen-carat, hall-marked albert and a diamond locket, I should think the suit would be cheap!

Of course, I don't mean a chain like *this* one:—"Nine stamps, and I send immediately, beautiful imitation gold chain, with seal attached.—Write, Hall, 18, Green Street, South Shields," although I can scarcely think that the one transaction can pay any better than the other.

Lewis's, of Liverpool, are creating a sensation amongst the "bumpkins" with their illuminated clock which is fixed in the high turret on top of their premises next to the Central Station. Instead of hands and dial it only shows the figures denoting *the exact time*, and these change every minute. The idea proves a great attraction, and is on the lines of a Geneva watch I saw a few days ago, which did the same thing *in addition* to giving the time on a twenty-four hours dial.

Sir Henry Bessemer has been calculating what an English billion (a million millions) actually means, and has taken a sovereign as a basis. He states: "A chain of a billion sovereigns would pass 736 times around the globe, or lying side by side, each in contact with its neighbour, would form about the earth a golden zone 26ft. 6in. wide. This same chain, were it stretched out straight, would make a line a fraction over 18,328,455 miles in extent."

Bashful young men! take a hint in courting from the Emperor Nicholas of Russia—or "Old Nick," as he was called. He was bashful, but he just "screwed himself up to sticking point" one day at dinner, and wanted to "pop the question" there and then, but didn't like to be caught at it, so he devised a novel expedient: He took off one of his rings, embedded it in a lump of bread, and passed it to his lady fair, who consented with just one nod. How quick ladies are to understand these things!

I am pleased to note that Royal Warrants have just been issued appointing the following firms Manufacturers to the Queen in Scotland:—Chronometer, Watch, and Clock Makers—Messrs. W. Cunningham & Co., Aberdeen, Messrs. James Muirhead & Co., Glasgow, Mr. Robert Bryson, Edinburgh. Goldsmiths, Silversmiths, and Jewellers—Mr. James Aitchison, Edinburgh, Messrs. Marshall & Sons, Edinburgh, Mr. Robert Stewart, Glasgow, Messrs. D. V. Rait & Sons, Glasgow, Messrs. George Jamieson & Sons, Aberdeen, Mr. Peter George Wilson, Inverness.

A writer in the *Church Times* tells a queer story *apropos* of the late West End Mission. Some fourteen years ago she mysteriously lost a spray of what were often mistaken for diamonds, but were in reality paste. A few days since that spray was anonymously returned in an envelope, bearing no other clue than the postmark, "London, W." The writer suggests that the act was a tardy effort at reparation on the part of some one who had been deeply stirred by the mission. I hope it may have been due to no less worthy motive.

Messrs. P. W. Davey & Co., of 4, Smith Street, Guernsey, are doing well, and I am pleased to record the fact. I guess they are the only people on the island who do electro-plating and gilding on the premises, and also every possible description of watch, clock, and jewellery repairs. Mr. P. W. Davey, the life and soul of the business, is the worthy son of my old and greatly esteemed friend Mr. W. T. Davey, the gilder, &c., of Colomberie, Jersey, and it is only to be expected that such an energetic parent should have a similarly pushing and energetic son.

Rumour sayeth that the London and North-Western Railway Company have administered a *coup de grace* to the new system of reckoning time all round the clock. After making a practical experiment with it in the shape of preparing a new time-table, they found that it would be so bewildering to the public and to the officials as well, that they have decided to abandon all notion of adopting it. It is said the cost of publishing the experimental time-table was upwards of £800. There will, therefore, be no alteration in the company's clocks at the railway stations.

A well-founded rumour reaches me to the effect that we are shortly to have in England, a machine-made watch company, on the lines of the Waltham Company in Massachusetts. The projectors of the new venture are all men in the trade; they will wait to see what "notions" can be picked up from the exhibits of American watch-making machinery at the forthcoming "Inventionaries," and then when all is ready will strike out boldly. I understand that a large amount of capital is promised for investment, and that the factory of the new company will be located not far from Islington Green. More of this anon.

The Inventors' Mart advertises the two subjoined patents for sale. The letters and numbers are the references thereto:—

Twenty-four o'clock.—Improved device to enable any watch to indicate up to 24 o'clock. Does not interfere with the dial or works in any way. Can be applied to any watch at a nominal cost. Firm of watch-glass makers wanted to take same upon royalty. [P1435

Curious Novelty in Clocks.—Can be made in a variety of designs. Peculiar automatic striking action. Can be made very cheaply so as to obtain a large sale. Will find a ready market in England or abroad. Invention for sale or on royalty. [U2306

Foreign and Colonial Items.

By A. Fischer.

From a report of the French Consul in Amsterdam to the *Moniteur D. L. B.*, we learn that French jewellery is not much sought after in Holland, it being too artistic and not appreciated enough. Articles of a more common make, and principally at a low price, seem to sell best; the fine jewellery being manufactured and supplied there by local houses. The duty on jewellery articles, bronzes, watches, clocks, and optical instruments amounts to 5 per cent. ad valorem, but gold and silver ware pay an additional 2—2½ per cent. for control or hall-mark.

The principal wholesale houses in Amsterdam are:—

Gold Jewellery, Watches and Bronzes.—J. M. F. Hendrichs et fils, Hendrichs, Kuinders et Cie, Ludolph Hausemaun, Oosterman et Cie, Plcner frères.

Gold Jewellery and Precious Stones.—A. Bonebakker et fils, Cosman frères, L. Sanders et fils, E. A. Van Gelder et fils.

Watches, Clocks, and Bronzes.—J. P. Kluijskens, P. W. Osieck.

The principal retail houses are:—

Jewellers.—Benten et fils, Roelof Citroen, Dickhoff et Salm, Lambert et Roon, P. F, Van Maarsseveen et Cie, S. Van Osenbruggen et fils, P. Van Santen, F. A. Wamsteeker, J. A. Wamstecker, J. H. Schmidt, J. W. Schmidt, G. M. Bosch.

Imitation Jewllery, Bronzes, &c.—Joh. P. W. Annegarn, C. M. Bodenheim, J. Van Coeverden, A. Cossa, C. Cossa, Vve W. Vanden Hulot, Merkelbach et Cie, Neerhoff et Cie, E. B. Vieth, Wille et Cie, F. von Windheim et Cie.

The latest novelty in rings in the United States is a large black enamelled ring with a precious stone. It is preferred especially by ladies, as it increases the whiteness of the hand. Wedding rings worn in New York recently consist in enamelled rings mounted with a pearl, or a pearl, a diamond, and a ruby.

Scarf pins, with pearls, are much asked for just now, and also jet and steel pins.

Silver jewellery sells very well, while gold is chiefly used for ornamentation.

Trade in Providence is not very encouraging, and payments are still slow.

In Brazils, especially in Rio-de-Janeiro, a good demand for silver and nickel plated articles exists.

The annual report from the Minister of Finances in Washington states the importation of precious stones in the United States for the year 1884 to be as follows:—

From France	£927,014
„ England	£502,342
„ Germany	£76,055
„ Holland	£37,329
„ Switzerland	£9,772
„ Belgium	£8,788

Diamonds exported from the Cape to England in

November, 1884	219,098	carats.
December, 1884	200,196½	„
January, 1885	218,571	„

The only goods finding a ready sale in Bombay just now are those of English manufacture. The principal houses in the trade in that city are:—Hamilton & Co., Marcks & Co., Favre, Lenba & Co,, E. D. Brandon. No duty on jewellery is levied in India. The opening of the Bombay Exhibition has been fixed for November, 1887.

The French Consul at Calcutta, Mr. M. Kraetzer, states that the watch and jewellery trade in India has for a long time been neglected, and to a certain extent is still so now. He remarks that low-priced articles find a much better sale than those of superior quality. In his report he gives also a list of the leading firms in Calcutta, but we do not reproduce it as all the names and some additional ones are given in *Fischer's Directory of Watch and Clockmakers, Jewellers, and Silversmiths of Great Britain and the Colonies*, which is in the hands of all manufacturers and dealers.

The Parisian organ of the jewellery trade gives the following table of weekly wages paid to good workmen in the jewellery trade:—

	£	s.	d.		£	s.	d.
Chicago	2	12	0	Germany	1	0	0
France	2	8	0	Austria	1	0	0
New York	2	0	0	Russia	0	16	0
England	1	16	0	Calcutta	0	11	2
Holland	1	12	0	China	0	9	7
Belgium	1	8	0	Cambodge	0	8	0
Switzerland	1	5	8	Annam	0	7	2

The last day for sending goods for the Nuremberg Exhibition has been fixed for the 20th of May.

In Leghorn about 10,000 women are occupied in coral working. Their wages vary from 5d. to 2s. 6d. a day. They work mostly at home, in the neighbourhood of the town, and in some special streets.

The largest clock known in the world is the electric clock in the tower of St. Peter's in Zurich, Switzerland. The diameter of its dial measures 28½ feet, and the long hand moves every minute about 17¾ inches.

Various attempts have already been made to replace the silver crucible by nickel ones, and it seems that these last ones prove to be excellent for melting the caustic alkalies. They support a much higher degree of heat, and are at the same time much less expensive.

The existence of the smallest quantity of mercury, even in a very weak solution, can easily be proved by dipping a thin, well-gilt silver thread in it, as the mercury precipitates itself on it at once.

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The remarkable invention of Mr. Webster, which caused such a stir in the metal world, appears to be making gigantic strides. Rolling mills for the aluminium have been erected at Sheffield, other rolling mills are to be erected near Birmingham, and the works at Solihull Lodge extended. There is also a foundry at Southwark, London, and, lastly, an establishment has been opened nearly opposite the Prince of Wales Theatre, Broad Street, Birmingham, where all kinds of articles made of the aluminium metal can be seen—from jewellery to ship propellers. Wire of the metal is now being drawn, it being found that the vibration is about is about one-third stronger than that hitherto used.

While in Dublin the other day, I halted in the front of Messrs. Chancellor & Sons' splendid premises in Sackville Street, and was pleased to note a most magnificent selection of high class goods. A fine large gold demi-hunter chronometer took my fancy very much, and looked to be a magnificent piece of mechanism. Jewellery of the most recherché description is also shown in both the precious metals, and, of course, set with every variety of precious stones. Messrs. Chancellor & Sons have a great Irish reputation as photographers, too, and I saw in their windows some beautiful specimens of that branch of art, including many of our greatest and best known celebrities.

Dissolution of Partnership.

Counsell & Son, Farringdon, Watch and Clock Makers. March 23, as regards Edwin John Counsell. Debts by Edwin Counsell, who continues.

Remington, John & Co., 64, Northampton Street, Birmingham, Manufacturing Jewellers. January 31, as regards John Remington. Debts by Edward Meredith Evans, who continues.

Musgrave & Henry, 21, Gloucester Street, Clerkenwell, London, Manufacturers of Silver Jewellery. April 2.

Barber Bros., 41, Northampton Street, Birmingham, Manufacturing Jewellers. December 31, 1884, as regards William Henry Barber. Debts by John Vaughan Barber, who continues under same firm.

Burbidge, Thomas, & Co., Broughton Road, Melksham, Silver and Nickel Electro-Platers. May 6, 1884.

Hancox & Heath, 55½, Tenby Street North, Birmingham, Manufacturing Jewellers. March 25. Debts by Joseph Heath.

Rhodes, T. and E., 19, Highgate, Kendal, Watchmakers and Jewellers. March 31, as regards Thomas Rhodes. Debts by Edmund and Robert Rhodes, his partner in the new firm of T. & E. Rhodes.

White & Hawkins, 15 and 16, Legge Lane, Birmingham, Silversmiths and Electro-Plate Workers. April 10, as regards Charles Henry White. Debts by Francis Henry Hawkins, who continues in his own name.

Appleby, James, and William Henry Sheldon, Albert Works, 22, Graham Street, Birmingham, Stud and Solitaire Manufacturers, Jewellers, &c. April 4. Debts by William Henry Sheldon.

Fish, Henry, William John, and Henry, 14 and 16, Kenton Street Russell Square, London, Pawnbrokers, Silversmiths, Dealers in Jewellery, and Salesmen. May 28, 1884, as regards Frank Fish.

Russell & Knight, 18, Albion Street, Birmingham, Wholesale Jewellers and Factors. March 7, as regards George Henry Knight. Debts by Louis George Russell and James Alexander Macdonald who continue under the same firm.

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Bankruptcy Proceedings, &c.

Naylor, Thomas, corner of Market Street and School Street, Cleckheaton, Jeweller and Watchmaker. March 27. Examination at the Bradford Coort, on April 14, at 12.

Sinclair, Walter, 2, Princes Buildings, Coventry Street, London, and Percy Villa, Humberton Road, Stockwell, Jeweller. March 23. Examination at 34, Lincoln's Inn Fields, London, on April 28, at 11.30

Baines, Charles Henry, 15a, Coney Street, and Havelock Terrace, Cemetery Road, York, Optician, &c. March 30. Exrmination at the York Court, on April 10, at 12.

Bayliss, John Potter, 25 and 27, Little Underbank, Stockport, Jeweller and Watchmaker. April 2. Examination at the Stockport Court, on April 24.

Boland, William Henry and Thomas Fairley (trading as **W. H. Boland & Co.**), 6 and 7, Forward Yard, 58½, Great Hampton Street, Birmingham, Jewellers. April 1. Examination at the Birmingham Court, on April 30, at 2.

Joseph, Lyon J., 88, Vyse Street, Birmingham, Wholesale Jeweller. April 1. Examination at the Birmingham Court, on April 22, at 2

Speight, William, 5, Northampton Square, Clerkenwell, and York Villa, 2, Highbury New Park, London, Manufacturing Jeweller. March 31. Examination at 34, Lincoln's Inn Fields, London, on May 5, at 11.

Todd, Charles Louis, 20, East Clayton Street, and 139, East Stanhope Street, Newcastle-on-Tyne, Jeweller. April 4. Examination at the Newcastle-on-Tyne Court on April 16.

Hinks & Radcliffe, 1, Vigo Street, Regent Street, London, Jewellers and Silversmiths. April 8. Examination at 34, Lincoln's Inn Fields, London, on May 15, at Eleven.

Wolf, Lionel Harris, 3, Low Ousegate, York, Jeweller and Dealer in Watches. April 10. Examination at the York Court, on May 1, at Eleven.

Davies, John and Shadrach (trading as **Davies, Shadrach, & Bros.**), The Strand, Swansea, Chain Makers. April 15. Examination at the Swansea Court, on May 14.

Michaelson, Jacob, 4, Heywood Street, Cheetham Hill Road, Manchester, Wholesale Watch Dealer and Jeweller. April 15. Examination at the Salford Court, on April 29, at Eleven.

Spencer, Edward Alfred, 277, Waterloo Road, and 17, Garnett Street, Hightown, Manchester, Music Seller, Jeweller, and Agent. April 17. Examination at the Manchester Court on April 30, at Eleven.

Mansfield, Thomas James, Shaftesbury, Watchmaker and Jeweller April 24. Examination at the Salisbury Court, on June 12, at Twelve.

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Bills of Sale.

(ENGLAND AND WALES.)

Pannell, John, 34, St. James' Road, Forest Lane, Forest Gate, Watchmaker. March 25. £30. Given to Mary A. Hall.

Turk, John, High Street, Lenham, Watchmaker. March 30. £30. Given to Southern Counties Deposit Bank.

Dedow, Adolf, 82, Cathnor Road, Shepherd's Bush, Diamond Setter March 27. £30. Given to Royal Advance Bank.

Inger, George Edward, 7, High Street, Nottingham, Optician. March 27. (Indemnity on securing comp.) Given to Deacon Bowker and another.

Birkenruth, Nathan, 103, Ladbroke Road, Notting Hill, and 97, Hatton Garden, Diamond Broker. April 2. £150. Given to Adolph Glück.

Kaiser, John, 131, Earl's Court Road, Kensington, Watchmaker and Jeweller. April 2. £200. Given to Emil Delger.

Southall, J. Back, 119, Latimer Street, South Birmingham, Jeweller. April 8. £60. Given to Thomas Allcock.

Davids, Edward Louis, 185, Grove Road, Mile End Road, Mile End' Diamond Broker. April 16. £30. Given to the Consolidated Credit Corporation.

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Bills of Sale Re-registered.

(ENGLAND AND WALES.)

Stewart, Edward Thomas, 37, Gloucester Place, Portman Square, London, Jeweller and Silversmith, to William H. Barbrook, B.S. filed July 16, 1879, for £553; re-reg. Mar. 27, 1885 (by order on terms).

Radclyffe, William, 188, High Street, Camden Town, London, Jeweller, to Charles I. Smart. B.S. filed Apl. 19, 1880, for £270 16s. 8d.; re-reg. Apl. 10.

Shaw, John, 43, Sincil Street, Lincoln, Picture-Frame Maker, to Ashby T. Mays. B.S. filed Apl 19, 1880, for £30, &c.; re-reg. Apl. 18.

Viney, William Henry, 25, Earl's Court Gardens, South Kensington, and 7, Gerrard Street, Soho, formerly 282, King's Road, Chelsea, London, Gold Beater, to Camille Wright (since transferred). B.S. filed Apl. 24, 1880, for £100; re-reg. Apl. 13.

Walter, John King Arthur, 37, Walnut Street, Waterloo Road High Town, Cheetham, and 60, Corporation Street, Manchester, Clock and Watch Maker, to Hastings D. A. Walter. B.S. filed July 23, 1880. for £200; re-reg. Apl. 16.

THE WATCHMAKER JEWELLER AND SILVERSMITH

Entered at Stationers' Hall.]

All need the beautiful—
Few can produce it.—GOETHE.

[Registered for Transmission Abroad.

No. 121.—Vol. X.]

JUNE 5, 1885.

[Subscription, 5s. per Annum. Post Free.

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Horology at the Inventions Exhibition.

THE exhibit of Mr. R. Squire's is one of the most important to the future of the English watch trade, in the Exhibition. He has undertaken the important task of re-modelling the English watch in order to get rid of the imperfections which exist, both in the movement and the case. The result is a movement which is a combination of the full plate and the three-quarter plate; and a case which, besides being quite new in some points, is also a combination of the three-quarter and full plate case; and is both dust and water proof. To the buyer it is important to observe that the cost of this improved watch is not greater than that of the full-plate watch.

The successive changes in style and character of the English watch have each left something unfinished, some imperfection which has acted as a drawback to the good which has followed the change. For instance, the Pair Case gave way to the Consular Case, but the latter was not as good a protector to the movement from dust and blows as the Pair Case. The three-quarter plate was an improvement upon the full plate in being less bulky, in reducing the risk to the balance pivots and holes from the case being pressed in upon them, and in setting the hands at the back; thus avoiding risk of damage to the hands and to gold dials. But the escapement was more liable to derangement from wear of pivot holes, through the shortness of the axes, *unless jewelled;* the barrel required the watch taken to pieces to get it out; and the cost of the fusee was much increased to get sufficient length of square, besides the movement being less easy to cap. Next, the going-barrel without stopwork has largely displaced the fusee, but it could be only got out of the frame by taking the watch to pieces. The size of the going-barrel is also a thing which has hindered its universal acceptance because of the small force exerted by the spring after about 18 hours. Again, the system of screwing the stud instead of unpinning the hairspring each time, was a gain, but it did not go far enough for adjusted watches, the spring of which must be perfectly free from side pressure. The practice of fixing the stud of flat spring watches before springing often makes it very difficult to adjust the watch through the proper strength of spring being too small or too large for the room assigned to it.

All these imperfections Mr. Squire has overcome in his new watch.

The case is dustproof—even waterproof. The hands set at back. The barrel is as easily removed as a fusee barrel, and the watch goes just as well after 24 hours as when wound. The balance is at the side like three-quarter plate, and unlike three-quarter-plate is protected from the case being pressed upon it. The staffs and scape pinion are longer even than full plate, thus rendering jewelling quite optional especially for the lowest price watch. The hairspring stud is adjustable to any size or shape of spring. The appearance of the movement is as elegant, and the same style as a three-quarter-plate, and outside is just as thin and nice looking, whilst the cost of production being that of a full plate makes its adoption by the retail trade and the public a matter of certainly.

So much for his key wound watches.

In keyless watches Mr. Squire has made improvements in the case which show how incomplete was the improvement when keyless work was adopted. The case being a protector to the movement from dust and blows or pressure should be as compact as possible, and to this end have as few openings as possible. A cover for the key holes of key watches is a necessity, but with the winding and set hands effected from the outside, what possible need could there be for *two* bottoms to a keyless watch, or for the back to open at all? Mr. Squire recognised this fact when he brought out the single bottom keyless watch some years ago which is now so popular; but now he has gone a stage further and made it on an improved plan so as to exclude dust and water from every opening, including the pushpiece, and pendant. This watch going in water is one of the attractions of the Exhibition. His new movement is made in keyless as well as three-quarter plate. We congratulate Mr. Squire on his success, and wish him the gratification of a rapid and extensive adoption of his new watches by the trade at home and abroad.

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Jewellery :

ITS HISTORY AND MANUFACTURE PRACTICALLY TREATED AND ILLUSTRATED.

(*Continued from page 151.*)

THE following is a description of two or three of the articles mentioned in our last as being found in the Tomb of Queen Aah-Hotep, and described by Dr. Birch. We intend to give in our next issue the drawings themselves.

Fig. 1.

Chain of gold, Ser, formed of wires very closely plaited, and exceedingly flexible, resembling one of the Venetian chains above-mentioned. It measures 1 metre 90 centimetres or 6·12,205 ft. long and weighs 1 kilogramme, or 2·680 lbs. Troy.

The ends terminate in the head of a water-fowl, probably the *Ser*, or goose, having above small rings *au*, to secure the collar behind. To it is suspended, by a small ring, a scarabæus of solid gold, with striated elytra and corselet, inlaid with lapis lazuli. This insect, called kheper, is a constant ornament in the Egyptian jewellery, and was used for rings by the military caste. It was the emblem of Self-existence or "being," and the changes or transformations undergone by the deceased in the future state.

In the lower part of the plate are a group of three finger-rings, Fig. 2, teba with spring wire setting at the side, set with carnelian, lapis lazuli, and turquoise, or pastes imitating the same. At the right side is a signet-ring, Fig. 3, khatem, set with a square revolving bezel, on which are four uræi serpents interlaced; on the left a silver finger-ring, teba, set with lapis lazuli.

Fig. 4.

Gold inlaid bacelet. These objects, called *mennefer en Kabu* or, when of solid metal, *meskat*, were much prized decorations, worn by all persons of rank. The present is formed of two bands, separated, and attached by hinges placed vertically and fixed by pins, as they are made at present in the East. The exterior is ornamented with repoussé figures in gold, and the field is inlaid with lapis lazuli. On it is the following scene twice repeated:—the monarch, wearing on his head the uræus, and a tunic, shenti, round the louis, Kneeling on the ground before the god Seb, the Egyptian Saturn, who, seated on a throne wearing the *teshr*, or red crown of the earth or lower world, holds him by both arms. Behind Seb is a water plant and signet; before the monarch his title "Son of the Sun of his race Aahmes, living like the Sun." Before the king are two jackal-headed genii, the spirits of *Tu*, saluting, *haunu*, the monarch. The hieroglyphs above their head are the titles of the king, "The Lord, magnanimous and eternal." Similar genii are seen in the scenes representing the mystical birth of Amenophis III. and other monarchs, whose birth is hailed by them. Two bracelets, inlaid, like the present, externally with pastes and lapis lazuli, and scenes with the sun, and inscribed with the name of Namrut or Nimrud, a prince of the XXII. dynasty, are in the collection of the British Museum. To return to the history of Assyria, it is a remarkable fact that hardly any articles of gold or silver, comparatively speaking, have, according to Messrs. Perrot and Chipez, been found in Mesopotamia, although it must be quite certain that those two metals must have abounded in the Nineveh of the Sargonids or the Babylon of Nebuchadnezzar. They consider that we must find a reason for their absence in the success with which the Assyrian tomb has so far avoided discovery. The tomb alone could offer a safe asylum to such treasures and preserve them for the inquisitive eyes of modern archæologists. Before being abandoned to the slow effects of time the temples and palaces were pillaged, and doubtless as long as the ruins were accessible to men, they were searched over and over again for the precious metals. Here and there in some hole or corner a stray trinket has escaped these successive searches. There is no doubt, from the testimony of the grave of one of the oldest cities in Chaldea, that metallurgy was far advanced in that country, for in them are found copper, bronze, lead, iron, and gold. Silver alone being absent.

Both in Chaldea as in Egypt, man soon learned to extract the metals from their ores. After gold, silver seems to have been the next metal to attract the notice of man, for reasons many of which are similar to those which we have advanced in the case of gold.

(*To be continued.*)

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Diamond Market Reports.

Amsterdam, June 2nd.—Our diamond market remains more or less in the same position as last week, viz.:—Little demand, sales difficult, and prices unremunerative for sellers. Favourable hopes, however, are entertained for a speedy revival of sales upon the arrival of foreign buyers.

Paris, June 1st.—The rather sanguine expectations of last week have not as yet been realised. The demand on our market is small in proportion to the great stocks on hand. Russian and Polish buyers are expected, and a change for the better is anticipated.

London, June 1st.—The mail-boat bringing the usual parcels of rough has arrived, and has brought rather under the average quantity. On account of the weak state of the Amsterdam and Paris markets for the sale of cut goods, there were not many foreign buyers present. The mail-boat Roslin Castle has already been cabled last Friday from Madeira, and is therefore expected to-day. The mail-boat Tartar left Capetown on the 20th ult., and is expected at Plymouth 9th inst.

Kimberley, May 2nd.—No improvement in the market here, and prices have a downward tendency.

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ERRATA.

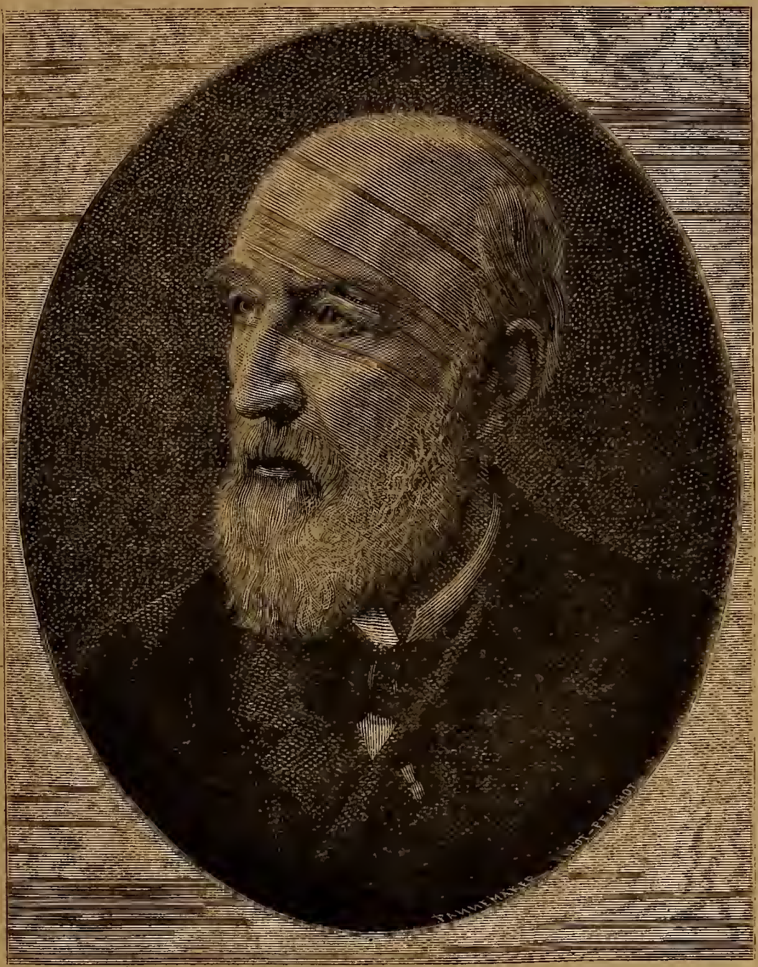
Articles "Skilled Labour," and "Few words about Adjusting Fine Watches," appearing in our April issue, should have been attributed to *The American Jeweller*, but by mistake this source was omitted. We are pleased to make this correction for our friends in Chicago.

Julien Hilaire Rodanet.*

On the 19th of October, died at Rochefort, after a long and painful illness, Mr. Julien Hilaire Rodanet, the father of the well-known director of the Horological School at Paris.

Eminent and distinguished artist as he was, his name will be attached to the science of horology, as well through the progress which he ensured it as through the various philanthropic works which he created, in order to compete to its development and its popularisation.

Born at Rochefort, S/M., on the 21st of April, 1810, he belonged to a Lyonese family. His remarkably well-developed disposition and the aptitude he showed during his childhood for horology, determined his parents to devote him to that profession, and to let him serve his apprenticeship to a well-known chronometer manufacturer, Mr. Mereeron, at Angonlême, who had at that period created a special establishment for the instruction of marine officers.



MR. JULIEN HILAIRE RODANET.

At the age of sixteen, J. H. Rodanet left for Paris, and remained there till 1837. He started by working in his own room, but soon made himself known by his skill and talent.

Befriended, although still very young, by Winnerl and other great artists of his time, he occupied himself in constructing, on his own account, the first keyless watches, of which he foresaw all the advantages.

He left Paris again in 1837, and established himself at Rochefort S/M, with the long-premeditated idea of creating in that part of France, where hardly any industry was developed, an horological school, and a manufactory, as soon as he could get some able workmen for the project. Combining the most generous and disinterested idea with the desire to ensure the philanthropic end in view, he meditated a great success, the Department of the Charente inférieure allowed him to receive as resident pupils, the foundlings by means of a premium of 300 francs. Although that price was much inferior to what board and lodging represented, Mr. J. H. Rodanet thought he would be compensated for his losses as soon as his pupils were able to work properly, and to co-operate towards his own work.

The number of boarders thus admitted amounted to about forty; and it was with that number of pupils that he commenced, with a remarkable method, to apply the machine to the manufacture of pieces which necessitated no great manual skill. Commencing with the necessary tools, and the special instruments of precision for the marine, he prepared theem, step by step, to the manufacture of travelling time-keepers, and of watches made entirely under his directions, in such a manner that in less than six years he obtained the unexpected result of presenting at the exhibition of 1844, cylinder and lever watches of French manufacture, and capable of competing in price and quality with the Swiss watches. He was rewarded with the silver medal and a flattering report by the Baron Seguier, who "ascertained that since 1839 Mr. J. H. Rodanet never ceased to "develop the horological science by all the means in his power. "After having trained young children of his country in the construction of travelling time-keepers, and familiarising them "with the execution of less delicate pieces than those of a watch,

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* Translated from the *Revue Chronometrique*.

“he finished by teaching them the construction of watches. Success crowned his efforts, and the products which he submits to the jury can, in quality and cost, compete with Swiss watches of the same character. The jury is pleased to recognise the perseverance which Mr. Rodanet shows; congratulates him for the prudent method which he followed in order to obtain such results, and awards him the silver medals for the service he has rendered to the town of Rochefort by giving it a new industry.”

Being of an enterprising spirit, and applying himself closely to all questions on mechanics, and by being preoccupied as he was, with the creation of his school and his manufacturing place, he found in 1840 still time to study all the questions regarding the door furniture of the floating basin of La Rochelle, and although out of the latitude of a watchmaker he conducted and finished that work with entire satisfaction.

The school existed till 1849. The expectation he had as regards the collaboration of the pupils he formed, however, failed, and most of them left him one by one to go to the arsenal, or to other watchmakers. With great regret, he was obliged to give up his attempt. Nevertheless some of his pupils showed great capabilities, and one of them is still now examinator in one of the principal watch manufacturies at Bordeaux.

Since 1849 Mr. J. H. Rodanet occupied himself exclusively with chronometors, which he manufactured in its entirety, even the cases. After a visit at Rochefort he received from the Minister of Commerce a subvention from the Government which, although insufficient again, allowed him to take 25 pupils to teach them that manufacture.

He was a competitor at the competition of the marine depôt, and several of his chronometers showed at sea very remarkable results: of these, No. 203 was particularly mentioned in the official reports.

In 1855 he exhibited chronometers and tools of precision, which assured him a first-class medal. “Mr. Rodanet,” says the reporter, “exhibited a marine time-keeper, and small instruments which he used to make experiments, and to observe at different degrees of heat the going of the spring, the metallic arch and the compensating metals in the circular chronometer barrel. He had two chronometers tested during a whole year at the Observatory, which were bought by the Government marine. The jury gives a first-class medal to that careful artist who neglects nothing to arrive at good results—in a country where he has only his own resources to fall back upon, and in which all has to be made in the factories.”

At the Exhibition of Bayonne, 1864, he received an honourable mention, and in the month of October of the same year, being member of the Chamber of Commerce, at Rochefort sur-Mer, he was elected Chevalier de la légion d'honneur.

He abandoned Horology in 1866. Retired to Rochefort, he continued his laborious career, and gave himself to the study of the art of precision until he died.

Mr. J. H. Rodanet was a very active collaborateur of the *Revue Chronometrique*, in which were published all his numerous articles on the relation between the diameters of the balance and cylinders, on his experience in regard to compensation balances under the action of heat, and to the regulators in extreme temperatures, for which he determined the direction and the proportions of the compensating metals; on the bi-metallic; on the execution of compensating balances, and the trials of compensation and isochronisme on cylinder springs, and on the manufacture of imitation stones.

Very few lives were so well filled up as his own. He shows what intelligence combined with a firm will can do. Artist of great merit, he created in a place which was not industrial before, an important manufacture which would have survived him if he had met with more encouragement. Animated to the end of his career by the desire to be useful to his fellow creatures, he leaves in his country the remembrance of private and public virtue of an excellent man, and at the same time an example of devotion and unlimited disinterestedness.

Diamonds and their History.

By James A. Forster.

(*Reprinted from “The Journal of Microscopy and Natural Science.”*)

Continued from page 166.

THE Brazilian mines were first discovered in 1727, in Sierro de Frio, and produced immense quantities of diamonds, so as to cause great consternation amongst possessors of old diamonds, and a considerable fall in values. Later on, other diamondiferous districts were found, and in 1843 the rich fields of Bahia were discovered. At this time, the total annual finds amounted to the astonishing quantity of 600,000, worth over a million sterling.* This production, however, was not maintained for long, and by 1851 had fallen to one-fourth, and was diminishing year by year. There are three distinct diamond-producing districts in Brazil, widely separated from each other, and evidently each deriving its diamonds from a different source. The first is the district of Diamantina in the Minas Geraes; the second some seven days' journey from it, in the district known as Bagagem, and which produces the finest quality; and, third, the district of Bahia, near the sea-coast. In the two first of these districts, the diamonds are found by washing an alluvial deposit, a peculiarly reddish gravel, known locally under the name of “Cascalhao,” which occurs underneath the present bed of the river, and is indeed the ancient bed of the river. To get at this, the stream is dammed off in the dry season, and shafts, from 6 to 30 ft., sunk to this diamond-bearing layer, the gravel is brought to the surface in baskets by negroes, and stored by the washing-sheds to be examined during the rainy season. The season during which the ground can be excavated in very short; I believe, not above ten weeks, at the end of which time the rains commence suddenly in such deluges as to destroy all works, carrying away the embankments and filling up all the holes, and the following season the miners have to begin again anew, and as all trace of former workings is obliterated, it not unfrequently occurs that a miner sinks his shafts on ground already worked, and thus has the season's work wasted. In this way, and owing to the great difficulties to be overcome, diamond-mining in the Sierras has become a most precarious and dangerous operation. In the third district, that of Bahia, the diamonds are also found in an alluvial gravel, but instead of occurring in the ancient beds of rivers, this gravel is spread in a very thin stratum over the face of the country, close to or on the surface, and requires little more than to be raked up and washed. In a locality discovered about a year since, called Canaviras, near Bahia, and now being worked with success, the gravel lies quite on the surface, and forms a stratum not six inches thick, and although the area over which it extends is very considerable, it is estimated it will be worked out in two years. In 1841, a paper was read before the Academy at Brussels by M. P. Chasseau, in which he claimed that in one locality, the Sierro di San Antonio di Grammagoa, the diamond had been found in its matrix rock. He described it as “grès psammite,” and it is, I believe, the same as the Itacolimite of other authors, which has been frequently described as a sandy freestone. It is, however, a mistake to suppose that this is the rock in which the diamond is formed. It is only a somewhat compact conglomerate, formed of the same elements as the cascalhao.

I will now turn to the South African diamond fields, the richest and most interesting in the world. The existence of diamonds at South Africa had been asserted many years ago, and there is a mission-map, dated as far back as 1750, on which is written, across the district of West Griqualand, “Here be diamonds,” and it is certain that the bushmen and Corannas have used diamonds for boring stones from time immemorial, and on several occasions the old Dutch Boers of Cape Town were excited about the matter, but the rumours died away, and were forgotten till 1867, when a travelling trader brought some diamonds to Cape Town, which he had obtained from a farmer on the Orange River. Sir P. E. Wodehouse bought them, and startled the world by sending them to the Paris International exhibition. Soon the Colony was all agog, and by 1870 5,000 people were digging on the banks of the Orange and Vaal Rivers, where the diamonds are found in much the same manner as in India and Brazil. These were, however, only what are known as the "river diggings," and were soon to be eclipsed by the so-called "dry diggings" of Dutoitspan, Bultfontein, Old de Beers, and lastly, but more important than all the rest combined, the mine of Colesburg Kopje, called at first New Rush, and now famous before the world as the Kimberley Mine. Here, at last, was the diamond traced to its parent rock, to its matrix, to the place of its crystallisation. Before describing the mine, let me draw your attention to the general characteristics of the country, although it is at present impossible to give a very exact geological account of it, as no two geologists who have been on the fields seem to agree in their description of the formation. In fact, there are not yet data sufficient to draw up a good geological map of the district. Kimberley is situated some 600 miles north-east of Cape Town and about 24 miles south of the Vaal River. The country, which is barren and sterile to a fearful degree, seems to consist to a considerable extent of a loose conglomerate, varying considerably in constitution, resting upon the Karoo shales of unknown thickness, and traversed in all directions by dykes of greenstone and other volcanic rocks. In places are large, superficial deposits of tufa, pebbles, and sand. Peculiar and marked features of the country are the salt-pans (shallow depressions of the land, containing saline deposits) and the low, truncated hills, known as Kopjes. These Kopjes rise 40 to 80 ft. from the plain, have flat tops, and seem to be protruding masses of a rock that has been described as basaltic, and are frequently more or less covered with a loose, fine, red sand. These remarkable hills are now known to be ancient volcanoes, and on such a hill was 10 years ago Kimberley Mine. The operations there, covering about 9 acres, have now not only levelled the hill, but have excavated the earth to the depth of about 800 feet, laying bare the sides of the crater. As the sand got cleared away, it was found that the "mine" is surrounded by hard, calcined shales, called by the miners "the reef." This reef contains no diamonds, nor does the stratum outside it, the diamondiferous earth being entirely inside—that is, surrounded by the reef. At first, the reef sloped inwards, thus decreasing the area of the mine, and forming a kind of cup, but at a certain depth it becomes vertical. The first layer was the loose, red sand, containing but few diamonds; then came a stratum of 60 to 80 feet of yellow ground, containing many diamonds; and below that the richest stratum of all, known as the blue ground, of unknown depth. This diamondiferous ground has been carefully and thoroughly analysed, and is found to consist of decomposed volcanic material.

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* The South African fields have proved much richer, the total finds of the four mines—Kimberley, Bultfontein, Dutoitspan, and De Beer's—being estimated for the year 1883 at 2,600,000 carats, of the value of three millions sterling.

The mine, or, more properly speaking, quarry, is worked by negro labour. The "blue ground" is first loosened by blasting, then dug out with pick and shovel, and hauled to the surface by means of aërial trams, worked by steam power. The ground, at first very hard, is then spread out, exposed to the sun and rain, and in about three or four months is in a condition to pulverise and pass through the washing-machine. Space prevents me longer dwelling upon this mine, which may be taken as a type of all the dry diggings of South Africa. They are all, both pans and Kopjes, volcanic craters. This is proved by the calcined reef surrounding them, and the character and analysis of the earth contained inside them; further, that the country had been subjected to great volcanic disturbance, is shown by the stratum being seamed in all directions by trap-dykes. That the diamonds of the Kimberley mine were formed in the earth in which they are now found, an examination of the output of the mine conclusively proves.

The diamonds from these mines are entirely different in appearance from those found in the gravels of Brazil, or India, or the "River Diggings," which always bear marks of travel; while these from Kimberley, to the minutest chips, show, by their sharp edges and brilliant polish, that they have crystallised where now found, or at most been only thrown up from below.

There now remains the question of their origin, and from whence came the material from which they crystallised. My theory is, that underneath the shale will be found a deposit of coal, perhaps under the mine, certainly in its near neighbourhood, (a rich coal stratum is now being worked, which crops up to the surface in the Transvaal about 100 miles distant from Kimberley,) and that subsequently to this carboniferous period the volcanos were in a state of activity, during which the carbonic-acid gas, evolved from the coal in process of formation, found an outlet into the pipe or crater of the volcano, entering it like a blast. The gas would thus be in the presence of the natural forces necessary to determine its crystallisation, viz., pressure and heat. The changes of temperature that the molten rock in the crater would be subjected to accounts for the shattered condition the diamonds frequently present; also for the irregularities of their crystallisation. Finally, the answer I would give to the question of "What is the diamond?" is that it is crystallised sunshine. The solar rays absorbed by the vegetation of the coal-measures now shine forth from these beautiful gems.

Correspondence.

To the Editor of the Watchmaker, Jeweller, and Silversmith.

Dear Sir,—The suggestion thrown out by "Horologist," in your last issue, has been under consideration here, but we fear it would hardly be feasible in practice owing to the small amount of space available for printing and writing on. We submitted a proof disc, to fit an ordinary watch, to the printers, but were informed that it would not be possible to print an intelligible reduced copy of the Observatory "Abstract of Results" on such a small surface.

Yours faithfully,
G. M. WHIPPLE.

Kew Observatory,
Richmond, Surrey.

Queries and Replies.

Electro Plating.—Can any of our readers give me information regarding the deposition of silver, on britannia metal, pewter, or iron?

[Unless quicked it strips in burnishing, and the ordinary quicking solutions are useless, as they contain acids which play upon the metal and turn it black.—G.E.]

D.W. writes asking whether it is legal for one tradesman to deface the names and address of another on a clock or dial hanging in a public place, or elsewhere, and to put his name and address in the place of it.

[The clock or dial is the property of the purchaser, and as such, can do whatever he pleases with same. If a person wrongfully uses the name of another and places that name on the watch or clock as the maker thereof, the party whose name is thus used has his remedy against the party so using it.]

Trade Receipts.

To Soften a Spring.—A spring may be laid flat and its temper drawn between two plates fastened together by a screw through the center, and placed upon the annealing plate. A small piece of whitened steel is laid upon it, to enable the operator to judge of the degree [of heat. Before opening, let it cool. When drawing the temper lay the coils farther apart.

To Prepare Chalk.—Pulverise the chalk thoroughly and then mix it with clean rain-water, in proportions of two pounds to the gallon. Stir well, and then let it stand about two minutes. In this time the gritty matter will have settled to the bottom. Slowly pour the water into another vessel, so as not to stir up the sediment. Let stand until entirely settled, and then pour off as before. The settlings in the second vessel will be prepared chalk, ready for use as soon as dried. Spanish whiting, treated in the same way, makes a very good cleaning or polishing powder. Some watchmakers add a little crocus, and we think it an improvement; it gives the powder a nice color, at least, and therefore adds to its importance in the eyes of the uninitiated.

Non-Corrosive Soldering Fluid.—A non-corrosive soldering fluid is prepared in the following manner: Small pieces of zinc are immersed into muriatic acid to saturation, which can be known by the cessation of the ebullition; the zinc, also, being added after this point, remains undissolved; add about one-third the volume of spirits of ammonia, and dilute with a like quantity of rain water. If the acid is gently heated at the time of adding the zinc, the dissolving will progress much more rapidly. The fluid causes no rust on iron or steel, and is even excellent for tinning.

Cleansing Brushes.—The best method of cleansing watchmakers' and jewellers' brushes, is to wash them out in a strong soda water. When the backs are wood, you must favour that part as much as possible, for being glued the water may injure them.

Reducing Diameter of a Watch Glass.—The diameter of a watch glass can be reduced by centering in a lathe, chucking it between two pieces of cork, or a pair of cork arbors, and applying a moistened piece of glass to the edge, or an emery stick. When the desired diameter is attained, polish the edge with pumice stone, followed by putty powder applied on a wet cork.

Tarnished Gilt Clock Bezels.—To remove tarnish from gilt clock bezels, dead white silver work, &c., dissolve 1 ounce of cyanide of potash in 1 quart of rain water; bottle it and label it "poison." Place the work in an earthen vessel, pour sufficient of the cyanide solution on the work to cover it, and the tarnish will disappear in five minutes. Re-bottle the solution for future use.

Varnish for Dials.—A handsome varnish for dials of clocks, watches, &c., may be prepared by dissolving bleached shellac in the purest and best alcohol. It offers the same resistance to atmospheric influence that common shellac does, when used as a coating on brass. The manner of applying it is easily learned.

To Temper Drills.—Select none but the finest and best steel for your drills. In making them, never heat higher than a cherry red, and always hammer till nearly cold. Do all your hammering in one way, for if, after you have flattened out your piece, you attempt to hammer it back to a square or round, you will ruin it. When you drill is in proper shape, heat it to a cherry red and thrust it into a piece of resin or into mercury. Some use a solution of cyanuret of potassia and rain water for tempering their drills, but the resin or mercury will give better results.

Cleaning Rags.—These rags, which are excellent for polishing metal surfaces, are prepared in the following manner: Dip flannel rags into solution of 20 parts dextrine and 30 parts oxalic acid in 20 parts logwood decoction, wring them gently, and sift them over them a mixture of finely pulverised tripoli and pumice stone. The moist rags are piled above each other, placing a layer of the powder between each two. They are then pressed, taken apart, and dried.

Cleansing Soiled Chamois Leather.—Many workshops contain a dirty wash leather, which is thrown aside and wasted for want of knowing how to cleanse them. Make a solution of weak soda and warm water, rub plenty of soap into the leather, and allow it to remain in soak for two hours, then rub it well until quite clean. Afterward rinse it well in a weak solution composed of warm water, soda and yellow soap. It must not be rinsed in water only, for then it would be so hard, when dry, as to be unfit for use. It is the small quantity of soap left in the leather that allows the finer particles of the leather to separate and become soft like silk. After rinsing wring it well in a rough towel, and dry quickly, then pull it about, and brush it well, and it will become softer and better than most new leathers. In using a rough leather to touch up highly-polished surfaces, it is frequently observed to scratch the work; this is caused by particles of dust, and even hard rouge, that are left in the leather, and if removed by a clean brush containing rouge, it will then give the brightest and best finish, which all good workmen like to see on their work.

Cleaning Watch Chains.—Gold or silver watch chains can be cleaned in a very excellent manner—no matter whether they be mat or lustrous—by laying them for a few seconds in pure aqua ammoniac; they are then rinsed in alcohol, and finally shaken in clean sawdust, free from sand. Imitation and plated chains are first cleaned in benzine, they are then rinsed in benzine, and afterward shaken in dry sawdust. Ordinary chains are first to be dipped in the following pickle: Pure nitric acid is mixed with concentrated sulphuric acid, at the rate of 10 parts of the former and 2 parts of the latter; a little cooking salt is mixed to this. The chains are boiled up in this mixture; they are then rinsed several times with water, finally in alcohol, and dried in sawdust.

Oil for Sharpening Tools.—Instead of oil, which thickens and makes the stone dirty, a mixture of glycerine and alcohol is used. The proportions of the mixture vary according to the instrument operated on. An article with a large surface sharpens best with a limpid liquid, as 3 parts of glycerine to 1 part of alcohol. For a graving tool, the cutting surface of which is very small, as is also the pressure exercised on the stone in sharpening, it is necessary to employ glycerine almost pure, with but two or three drops of alcohol. Kerosene oil is the best thing to use as a lubricant for hard stones such as the Arkansas.

To Speedily Make Ivory Flexible.—Immerse in a solution of phosphoric acid (specific weight 1·13) until it partly or entirely loses its opacity; then wash it in pure cold water and dry. In this condition it becomes as flexible as leather, but gradually hardens when exposed to dry air. An immersion in hot water also destroys its softness and flexibility. The following method may also be used: Lay the ivory in 3 ounces of nitric acid, diluted with 15 ounces of water. The ivory will be soft in three or four days.

To Bleach Ivory.—Ivory that has become yellow, may easily be bleached in the following manner: The article is placed under a glass bell, together with a small quantity of chloride of lime and muriatic acid, whereby chlorine is developed, and exposed to sunlight. Be very careful not to breathe the vapours, as they are very poisonous. The bleaching power of the chlorine destroys the yellow pigment upon the surface, and the article will be restored to its original lustre.

To Clean Ivory Ornaments.—Ivory ornaments are quickly cleaned by brushing them with a new, not very sharp, tooth brush, to which a little soap has been given, then rinse the ornament in lukewarm water; next dry it and brush a little, and continue brushing until the lustre reappears, which can be increased by pouring a little alcohol upon the brush, and applying it to the object. Should this have become a little yellow, dry it in gentle heat, and it will appear as if new.

Out and About.

By P. Howard.

The value of a ton of silver is 37,704 dols. 84 cents.

Silver ore of great richness has been discovered in Queensland.

To always be before time—carry your watch behind you.

The key to the situation in Afghanistan.—The "*watch*" key.

Only a question of time—"What o'clock is it?"

A boy in Belfast swallowed a large diamond cluster ring worth £20 a few days ago. He is in the hospital.

Don't forget! There are flaws in diamonds, flies in amber, and faults in every man. Look at home! look at home.

Silver and old oxydized jewellery is now the rage for wearing with evening toilettes. Paste figures largely, of course!

The largest sum ever accumulated in one lump is said to be the 500,000,000 dollars now in the United States Treasury.

Speaking of that, one million dollars of gold coin weighs 3,685 lbs. avoirdupois, and the same value of silver weighs 58,920 lbs. $1\frac{2}{3}$ oz. avoirdupois, fresh from the mint.

"Did your bring your opera glasses with you, love?" "Yes, hubby, dear, but I can't use them," "Why, my pet?" "You see I left my diamond rings at home."

The clock weight in Trinity Church tower, New York, is said to be the heaviest in America. It takes two men over an hour to wind it up.

What a blessed "rumpus" is going on about the "mystery gold!" One would imagine that this is the first time that clever swindlers had been unearthed! Read elsewhere in our pages for fuller particulars.

The business at 33, Grafton Street, Dublin, established in 1826, has changed one of its principals of late. Messrs. White & Schopperle are the new successors of Messrs. Topham & White, goldsmiths, jewellers, and watchmakers.

A gentlemen who fancied himself a pendulum, always went "on tick," and never discovered his delusion till he was very carefully wound up in the Bankruptcy Court. Next!

An advertisement reads as follows:—"Stolen, a watch worth ten guineas. If the thief will return it he shall be informed where he can steal one worth two of it, and no questions asked."

It is calculated that the silver which has been dug out of the Cornstock mine, in Nevada, would load the ordinary wagons of a luggage train 547 miles long.

"The Board of Trade have awarded a piece of plate to Captain Paul François Lescalles, of the French barque *Leopold et Marie*, of Bordeaux, in acknowledgment of his humanity at sea." But who made the "piece of plate," and what was it like?

A regular spanker of a shop has been opened during the month at 88, Union Street, Aberdeen, by Mr. H. L. Greenbury, for the sale of jet goods of all kinds and inique jewellery, *i.e.*, steel, garnet, onyx, pearl—*and "sich."*

The yield of gold in New South Wales has fallen considerably of late. The Bathurst District is supposed to be one of the richest. At Carcoar, 33 miles from Bathurst and 173 from Sydney, the yield of gold in 1883 was £30,900.

A Paris telegram says an alarming crisis may be shortly expected in the nickel and white metal industry, which is suffering from the glutted state of the markets. Many of the largest factories are closed.

Platinum has been discovered in New South Wales, in connection with gold, in the Ophir district. It has been found in the form of small grains in the Hunter and Macleay districts, and a nugget weighing 268 grains was obtained from Wiseman's Creek with alluvial gold. The sand of the sea coast near Richmond River is also found to contain this precious metal.

Nevada gold-seekers have discovered a new use for fowls. It is a common sight there to see men and women carrying a hen under one arm and a basket of chickens under the other. When they reach their destination the hens are picketed, and, being already hungry, being to scratch and eat. After three or four days' honest toil they are killed, and their craws examined for gold. As much as eight dollars has been found in one craw.—*Alti-California.*

A silver polish paste is made by mixing—Cocoanut soap, 50 grs.; tripoli, 5 grs.; ammonium carbonate, $1\frac{1}{2}$ grs. The soap, cut fine, is dissolved in just sufficient water to form a paste, then well mix the other ingredients. Fill into pots and cover with parchment paper.

Mr. John H. King, Jeweller, Middlesborough, is a philosopher. He advertises "If you don't like to go to a shop to buy a wedding ring, send to me and I'll forward one at my own risk." Here's a chance for bashful swains!

The Duke of Bedford is no flat. Certainly he "came down handsome" when his daughter married Sir Edward Malet, but there, don't cherknow, those diamonds are not to run away, or to be dropped into the hands of *any* sort of rapscallion, not they, *they are entailed!*

Of course the last paragraph ought to be headed: "Fashionable Intelligence," only it ain't, so there! However, I take the two following items from a "Fashionable" sort of a "Sassiety" journal, and I reprint it merely to show the sort of rubbish which is allowed to masquerade as "Fashionable hints for the toilette." "Very few jewels are observed in the evening; there are leaders of fashion who wear scarcely any, others who wear none at all just as their own fancy dictates." "Dog collars are being introduced, of fine jet, pearls, gold and silver bands, &c.: in fact, everything is now done to lengthen the neck and to give it an upright, stiff appearance." Now that you have read them, please laugh at the twaddle, and oblige.

But here *is* a little bit of Sassiety Intelligence, and it is vouched by a brother editor—"who never told a lie." (George Washington *revised.*) A Chicago merchant has ordered in Paris a wedding robe for his daughter, to be made of white velvet and to be trimmed with real pearls. Two things in this connection are evident; first, that weddings do not occur often in that family; and secondly, that there is nothing mean about that papa!

Employer: "John, my watch has stopped. What time is it?" John (new man): "Half-past thirty-seven o'clock." Employer: "Goodness me! what do you mean? What did you work at before you came here, anyhow?" "I was an inspector of gas meters." "Oh!"

Says a contemporary:—The engagement ring for this season is a circle of sapphires. It indicates the springtime of affection.

"Then woo me not with chrysolite,
  Thy diamonds and thy rubies spare;
But when to thee my troth I plight
  Let sapphires be the stones I wear."

Mrs. Connor, wife of the proprietor of the St. James's Hotel, New York, was robbed of 6,000 dols. worth of diamonds at the hotel a few weeks ago. Thus far there is no clue to the thieves. It would seem that American police are pretty much the same as English.

That recent Sunday's snowstorm had the effect of stopping a large number of clocks in public places in London. Some surprise has been expressed at this fact, but it appears capable of explanation. The Saturday was rather a warm day. The temperature fell suddenly early on the Sunday morning, and very naturally the sudden contraction of the metal of the clocks thereby brought about was sufficient to stop them.

It is currently reported that a splendid pearl has been discovered by a Swansea fish merchant in an oyster brought from the Mumbles Head, Glamorganshire. The pearl has been examined by a firm of well-known jewellers, who declare that it is worth £50. I am awaiting further news on the subject.

The cat's eye is a popular gem for gentleman's sleeve-buttons and scarf-pins. It is supposed to possess the virtue of enriching its owner and insuring luck.

It is stated that a large diamond clasp, worth a thousand guineas at least, was picked up in the corridors, or from the floor of the Throne Room, after the recent Wednesday's Drawing Room.

Pickle for whitening silver watch cases, silver filigree, &c., after soldering, is made as follows:—One ounce of nitric acid, two ounces sulphuric acid, eight ounces rainwater. If the pickle can be boiled with the article in it, it is better, and is the only way in cleansing filigree work. Watch cases, spoons, &c., can be heated until they are quite warm and then immersed in the pickle.

An anecdote is related—founded on fact, of course—illustrative of the slyness of the Bohemians, compared with the simple honesty of the Germans, and the unscrupulousness of the Hungarians. In war times three soldiers, one of each of three nations, met in the parlour of an inn, over the chimney-piece of which hung a watch. When they had gone, the German said, "That was a good watch; I wish I had bought it." "I am sorry I did not take it," said the Hungarian. "I have it in my pocket," said the Bohemian.

'Tis an ill wind that blows nobody good, and so this last new "fad" about watch cocks is paying—and that *well*. Old verge movements which people were glad to get rid of at a shilling each, have suddenly become little gold mines, and therefore the "verges" are no longer despised pieces of property. This new style of jewellery has "hit" the public taste with a vengeance, and I'm glad of it, *pro tem*, but I raised my eyebrows the other day on observing a lady sitting in her carriage and wearing necklet, pendant, earings, and bracelets, all made of gilt watch cocks, and her ugly little brute of a pug dog had a collar of the same things!!

The opening of the new parish offices at Birmingham is said to have been a brilliant affair. The portion of the whole which concerns us most may be condensed into the following report, for which I am indebted to a local reporter:—Mr. Stout, on behalf of the Office Building Committee, the architect, and the builders, addressed the chairman, and he had great pleasure in presenting to him a gold key as a memento of the ceremony he now asked him to perform—namely, that of declaring the new offices open. He then handed to the chairman a case containing an artistically-made key in combination of silver and gold, the work of Messrs. Elkington & Co. On one side it bears the inscription, "Presented to William Price, Esq., Birmingham Parish Offices, opened March 3, 1885." On the other side are the Birmingham coat of arms, enamelled on a gold panel, with the figure of Charity in relief also on gold. On a silver plate upon the case is an inscription showing that the presentation was made on behalf of the Building Committee of the Parish Offices.

I have been to "Auld Reekie" again. I have promenaded Princes Street and taken a view of what was going on in the trade, but that noble thoroughfare is so aristocratic, so filled along the one side with magnificent shops, and the windows of the latter are so elaborately set with chaste, choice, and elegant goods, that I don't know where to commence reporting on them. I'm dead licked! One thing is certain; I know of no other street in Europe which can show a similar number of high-class jewellery establishments in the same length of space, nor do I know of any other part of creation where so much silver and stone set jewellery is displayed. Reader mine, let me go through the list as briefly as I can. Messrs. Millidge & Sons are next house but one to Messrs. Mossman & Sons; with the exhibits made by each I was charmed; then all of a group come Mr. J. P. Hutton, Mr. Barrie, Mr. Alexander Hay, and Messrs. Bailey and Chisholm, all of whom made me feel proud of our trade by their excellent displays which vied with each other in good taste and grandeur; near by is the magnificent show of Mr. Aitchieson, resplendent with his prize medals, and only a few steps away are the gorgeous houses of business owned by Messrs. Mackay, Cunningham & Co., and Messrs. G. and M. Crichton. My descriptive powers fail me—to do my subject the justice it deserves, and so does my patience just now—for there is that confounded printer's devil of ours, screaming "It's better than nothing at all, not much!" through the keyhole, a I write. I guess if he escapes with his life shortly, he'll say "It's better than nothing at all!"

The following letter requires no preface from me, it will speak for itself:—

Kasr-el-Nil, Cairo, Egypt,
March 25, 1885.

Dear Sir,—We have a number of your Keyless Lever Watches, supplied to her Majesty's Government for telegraph service at the various Nile stations between here and Korti. They have given great satisfaction, and are not affected by the climate.

Yours truly,
A. Botham, Quartermaster.
Telegraph Battalion, Royal Engineers,

To Mr. T. R. Russell, Cathedral Works,
18, Church Street, Liverpool.

A curious dispute is now being waged in Paris respecting the proprietorship of a pearl (valued at £48) which a gentleman found in an oyster at a *cafe* restaurant. The customer, the *cafe*-keeper, and the oyster merchant all claim the pearl.

Devonshire is a funny place, and no mistake! Let me tell you what it is celebrated for. Clotted cream; cream cheese; ruddy-faced women with big feet; cider; conservatives; stomach-ache; "sky pilots;" heretics; speeches on "Nothing" (Ahem! Excuse me, Salisbury, old boy!); bad railways; exorbitant fares; Dartmoor Prison, and—don't let me forget—presentations. Devonshire people are such a funny lot, that I have heard them going out on Sunday morning to dig treacle out of mines! Oh yes! *this is a fact*, and you may swear by it!

Let me deal with one thing at a time. There is a village down there called Kentisbeare (although I think "Kentish beer" would be more like it—but no matter-r-r-r! (and in ye aforesaid *w*illage resides one Mr. Downes, a sky pilot. Lately, Mr. Downes has gone *up* in the world—he has been "called" to a fatter living—and his sheep (beg pardon, I *mean* "flock") have therefore presented him with a parting gift (note: the flock did the "parting") in the shape of sundry things, to wit: One silver tea service (*not* a church service) set of tea spoons and tugar songs—oh, hang it, I'm getting mixed! "sugar tongs" is what I meant—a plated tea tray and a clock. All these were suitably engraved and were supplied by that excellent trinity, Messrs. Ellis, Dupree, & Tucker, of Exeter. Doubtless the Rev. Mr. Downes is happy *now*, in consequence of this addition to his worldly possessions. I hope he may be, because you know it is easier for a heaven to enter a rich man than a needle to go through the eye of a camel, &c. (Boy, what sort of whisky was that you just brought? *Irish?* Well, I thought I was writing more like a "Mick" than anything else!)

Luk heere now! Oim' tellin' yez! It's meself as'll be puttin' another eye in yer 'ed if yez are afther blarneyin' wid me! D'ye heere that? By the poiper that played befoore Moses O'ill have the loife av yez ef yez bees homboggen heere any moore! Whisht! Wait whoile Oi tell yez what a gim av a bhoy me ould frind Mishter Carty, of 86, Grafton Street, Doblon, is. He ad*ver*tisses just loike this:—A "Real Gem."—The Half Guinea Gem Ring in Fine Gold, mounted with Pearls, Rubies, Coral, or Turquoise. Also at 17s. 6d., 20s., 30s., 40s., 50s. each, and up to £30. William Carty, Jeweller and Watchmaker, 86, Grafton Street, Dublin. Isn't that Oirish whit, now?

Le Temps (Paris) is responsible for the following report of a robbery, and which is going the rounds of the English press, but which is looked upon as a *canard*, because the name of the host is suppressed, and the address is too vaguely given:—

"Last Monday evening, the Marquis de M——. was giving a grand party at his hotel in the Faubourg St. Germain. An additional staff of cooks, waiters, &c., had been engaged for the occasion. A clever thief contrived to gain admission, dressed in the garb of a cook, and at a moment when he was unobserved purloined a large quantity of plate, which he secreted about his person. Before he got clear of the premises, however, the theft was discovered, and an alarm raised, the hall porter receiving orders to allow no one to quit the house. Suddenly somebody came running downstairs four steps at a time, and shouting to the *concierge*: "Quick, open the door!" "Nobody is allowed to go out; there's a thief in the house." "Just so! and I am going to fetch the police." The porter opened the door, and the man, who was none other than the thief, got off, nor has he yet been arrested.

Entre Nous, I am becoming pretty well disgusted with the watch and jewellery advertisements which are appearing in the press, and in particular with those in the "religious" papers, and I feel surprised to note that the proprietors of these "godly" (?) issues think so much of the earthly trinity of £ s. d., that they allow their journals to become the means of swindling people out of their hard-earned savings for sham jewellery, worthless watches, and such rubbish. I allude to the "coupon catch" whereby some paltry and dishonest humbug—who emanates from either a suburban cottage or a miserable little office—poses as a philanthropist (?) and offers some such bargain as "an eighteen carat gold chronometer, English manufacture, timed and adjusted, tells the time in nine languages, full jewelled in every hole (and a few more besides) A1 at Lloyds, copper bottomed, double back action, strikes only on the box, parts its hair in the middle, every packet guaranteed by the trade and signature, ask-for-it-and-see-you-get-it, warranted for 914 years and three minutes," &c., &c., for thirteen stamps! Newspapers which will pander to such clap-trap advertisements are a disgrace to British journalism.

Harping on the same string for a moment; I have—for curiosity sake—just invested a shilling in these "religious"—or *ir*religious, which?—papers and got twelve of them for my money. In these I have found Forty-four of these swindling clap-trap advertisements for watches and jewellery (besides *seventeen* others for other various articles) some of which offer to send "valuable articles" of *bijouterie* for as small a remittance as seven stamps. Knowing as I do that these papers circulate mostly amongst poorly-educated but mildly bigoted people, and have *entrée* into their houses and families, I think I have found out why it is that the domestic servant, "Jemimer Hann," so frequently purloins articles by which to raise the seven, thirteen, or more stamps, which she remits for these gew-gaws and worthless bits of frippery, and in the same way I account for so many office boys stealing the postage stamps from their employer's offices, and I am so deeply impressed by this that I am thinking of making a collection of these clap-trap and disgraceful announcements, and placing them in the hands of the Scotland Yard Authorities. Let us have a pure and respectable press by all means, and let the religious press do its duty by setting an example.

"To be or not to be, that is the question," although *really* the question is whether it should be 24 o'clock or zero? Some watch makers have arranged the dial so as to make the concluding hour 24, while others are equally confident that there can be no such hour at all, and that after we have reached the mystic moment of 59 minutes 59 seconds past 23 we come to zero, and start afresh. This weighty problem has been agitating the breasts of the watch trade lately, and a Midland manufacturer has shed ink upon the subject, invested a penny in a Queen's Head, and worried "the powers that be" at Greenwich Observatory on the topic. Result: *There is no 24 o'clock, i.e.*, it is Zero. Now, then, brother watchmakers, here's your chance to get thousands of "jobs" again by altering the *already altered* 24 hour watch dials to 23 o'clock and zero! "It's an ill wind," &c., &c. *Verb. Sap.*

A Royal Order for Birmingham.

THE Queen has been graciously pleased to entrust to Messrs, T. and J. Bragg, of Birmingham, the work of mounting a special fan, intended as one of the Royal gifts to the Princess Beatrice on the occasion of her marriage. The desire was that it should be a specimen of English art manufacture. The commission to paint the fan, after a limited competition as to design, was given to Miss Mauly, of the Female School of Art, 43, Queen's Square, Bloomsbury. For the mounting and decoration, Sir Philip Cunliffe Owen, of South Kensington Museum, suggested to Her Majesty the name of Mr. J. W. Tonks, of the above firm, whose designs and productions at the Health Exhibition last year had attracted attention. The Queen expressed her pleasure that the making of the fan should be undertaken by a former student of a British School of Art. The painting is executed upon white silk. A spray of orange blossom forms a feature of the obverse side, the flowers and foliage going below the limit of the silk, and depending gracefully upon the open brins of the fan. In the sky above, a number of young loves are gaily sporting, some with trumpets announcing the happy occasion, others suspending by silken ribbon in mid air the Princess's coronet, having in golden letters beneath it the name "Beatrice." In the distance is an excellent view of Osborne. On the reverse of the fan is painted a stand of bee-hives, with bees approaching another spray of orange blossoms. The framework of the fan is finest ivory, the protecting mounts are in silver, wrought and repoussée work, interspersed with diamonds. The outer edge sloping to the ivory is festooned in a light lace-like pattern in silver cord after the Etruscan manner. The main features of the inner design are boldly raised edges, accentuated at short intervals by diamonds, the largest brilliants finding their places at the leading divisions of the mounts. Within these borders the artist in repoussée has had a fair field for the exercise of his best gifts, and has well availed himself of the opportunity. The orange blossom and myrtle have been chosen as the motives of the decoration, and these are continued in flowing lines, each panel being distinct in design, but with equal art in spacing and arrangement, producing a very happy result. The initial letter "B," with coronet over it, appears without undue prominence on the upper mount. A superb ivory box, with initial device, lock and key, is the casket for this specimen of art jewellery. The Royal message respecting it is as follows:—"The Queen expresses her entire satisfaction with and admiration of all its details. It certainly does the highest credit to both the young lady who designed and painted it, and to Messrs. Bragg for the clever and artistic manner in which the mounting has been executed."

We are pleased to be able to add that Messrs. T. and J. Bragg have received the Royal Warrant, authorising them to use the words, "By Appointment," for the successful execution of the above order.

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A Clever Swindle.

ONE fine morning a lady of charming manners and address called upon a physician in New York City who had a high reputation for skill in mental disorders, and who took under his personal care a few patients whose friends could afford to pay well for the attention. The lady, with many sighs, poured her tale into the sympathetic professional ear. She had a brother who, poor fellow, was slightly deranged. He was apparently perfectly natural on all ordinary topics, but entertained extraordinary delusions in connection with precious stones, His mania seemed to consist in the belief that he owned a quantity of jewelry, and that he had disposed of it at a high figure. He was in the habit of clamoring for payment, and when this was refused would bewail that he had been robbed. Terms, she intimated, would be no object.

The physician listened patiently. A number of delusions of this character, he remarked, had come under his personal experience. Precious stones were favourite subjects of hallucination. His closest attention should be given to the case.

It was arranged that, to avoid exciting the patient's suspicion, he should be directed to call next day for his sister at the doctor's residence, and that she should then take occasion to bring him into contact with the doctor. The lady then sorrowfully withdrew.

The heaviest purchaser at the diamond counter of one of the largest jewelry palaces in New York that afternoon was a lady whose manners were marked by a fascinating blending of dignity and grace. She selected a diamond *parure* of exceptional beauty and high price. Having made this purchase, she directed that it should be sent punctually at eleven o'clock next morning to her residence. Her husband, Dr. Blank, would be prepared to make payment upon delivery. This request was perfectly regular. It would be unusual for a lady to carry a cheque-book or so large a sum of money with her. Dr. Blank's name was in the medical, city, and elite directories. The lady's request was readily assented to.

At the time appointed, the salesman presented himself at the house. He was shown to the parlour, where he found the fair purchaser of the day before him. "Were the stones there just as she had selected them? Oh, yes; how very nice! Was the bill ready also? Yes. Well, would the gentleman step into her husband's study and obtain the amount of his account? Before he went away, however, she would like to see him again with regard to some rubies as to which she would like to have the benefit of his opinion."

The doctor received the salesman with much suavity. "How was he feeling? Had he slept well lately? Was his tongue coated and his rest disturbed by unpleasant nocturnal visions?"

"He was puzzled by the doctor's questions, was he? Mind unable to grasp the meaning of these questions? He was not a patient. Of course not! Oh! he had not come to collect a bill for some jewelry? Oh! just so! They would attend to that little matter presently—pres-ently. In the meantime, how was the appetite?"

The salesman grew impatient. "Ah! easily excited; temperament abnormally irritable! The usual symptons—the usual symptoms! He had a bill for the jewelry delivered, had he? Just so, just so; an interesting bearing out of the old adage that there is often method in mad—well, well; this bill should be attended to—all in good time—all in good time." "The doctor seemed to be under some misunderstanding!" "Not at all! The doctor understood the case thoroughly—very thoroughly. And now, how about the diet? Were the meals taken regularly? Very important matter this taking the meals with regularity!"

The salesman became annoyed. "Was the doctor mad?" "To be sure he was! What a queer coincidence! A gentleman who was the Hereditary Grand Vizier of the planet Saturn, and who was at the present time one of the doctor's most interesting guests, had asked that self-same question that very morning. Everybody in this house was sane except the poor doctor, and he was mad—mad as a March hare! He ought to be borne with patiently in his affliction! Never mind about that, eh? There must be an immediate settlement or the jewels must be returned? Quite so—quite so. That should be arranged to everybody's satisfaction by-and-by—by-and-by. Patience, quietude, were all that would be necessary. Let the patient be seated. Was he troubled with heart palpitation or excessive thirst?"

The salesman became angry. The doctor fixed upon him a magnetic eye, and was more professionally suave and soothing than ever. The more the payment of the bill was pressed for the more the doctor begged that the patient would not excite himself, and assured him that everything would be done to make him comfortable and happy in his new home.

The salesman, agitated and alarmed, made for the door, in quest of the lady and the jewelry. The doctor was at the door before him, still fixing him with the same magnetic glance, and more suave and soothing than before. The salesman sought to effect an exit by force. The doctor touched an electric knob beside the door post. In an instant two stalwart attendants made their appearance, and two minutes later the salesman was raving away like mad in a straight-jacket.

The doctor stepped into the parlour to consult with the sister of this unfortunate lunatic. She had disappeared. So had the diamond *parure*. Neither has ever been found.—*United States Watchmaker.*

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Transmission of Power.

By M. Grossmann.

[From Allgemeines Journal, Der Uhrmacherkunst.]

The uniform transmission of motive power from the barrel, through the train to the escapement, is a matter of great importance. This uniformity can only be obtained by good depthings; and since it is well-known that depthings are more perfect with the higher numbered pinions, it is advisable never to have the centre pinion with less than twelve leaves, the third and fourth wheel pinions with ten, and the scape pinion with at least seven. The difference resulting herefrom in the art of manufacturing is so very trifling, that it cannot be an obstacle to making even low grade watches with these numbers.

It must be admitted that the centre pinion will become more delicate hereby, and more liable to injury by the sudden jerk resulting from a rupture of the mainspring, or by the pressure occasioned through careless winding. The teeth of the barrel, too, being necessarily thinner, will be more apt to bend from the same causes; but this is partly remedied by the fact that, with a pinion of twelve leaves, there are in almost every moment two teeth of the barrel acting at the same time on two leaves of the pinion, while in the lower numbered pinions one tooth alone has to lead through a more or less extended angle. Any sudden shock will in this manner be divided between two teeth of the pinion of twelve, and sustained in the same way by two teeth of the barrel belonging to it, whereby the apparent danger is greatly diminished. Besides, the finer toothing producing a better transmission of power, a weaker mainspring may be used, and in case of its rupture the shock will be less violent. One of the main conditions for a good and uniform transmission of power is a good and suitable shape of the wheel teeth; and it is astonishing to see in what an indifferent way this important matter is treated. It is a well known fact that the wheel teeth, in order to act properly, ought to have an epicycloidal rounding, and no engineer would suffer any other form for the teeth of the star wheels. Berthoud treated this subject in a most elaborate way about a century ago. Reid and others have also explained the principles of the construction of toothed wheels most explicitly, but in vain. It seems that the greater part of the horological fraternity have resolved to view the shape of their wheel teeth as a matter of taste. All the English and other makers, with very few exceptions, impart to their teeth a shape defying the rules of Berthoud, Reid, and other masters—a shape of which nothing can be said, except that they look very nice in the eyes of those that make them, or those who use them, and say, "They look much better indeed than those ugly pointed teeth." There is no possibility of being successful against arguments like these, and I have known many a respectable and good watchmaker who declared that he could not bear the sight of teeth with an epicycloidal rounding. This is a subject, however, that should be well studied by every watchmaker.

British Trade and Foreign Competition.

Whilst all British industries are suffering from stagnation, none are so liable to depression as those which depend on the overplus of cash for luxuries, and of these jewellery, watches, &c., are the first to suffer. The question has become a serious one and is deserving the earnest attention of those directly interested. Continued effort would do much to resuscitate that industry of art to its former rank, and this could be done notwithstanding the many advantages of foreign workmanship. What is to prevent the representatives of the watch and jewellery trade from meeting at an early date to consider the question and so keep pace with action taken on behalf of other industries? The English workman need not fear the competing elements of foreign countries, providing the handicapping of British enterprise, in the way of restrictions and trade imposts, are discontinued. Free trade to the foreigner should be met by perfect freedom to the British workman for British production.

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Trade Notes.

Hudson's Extract of Soap is the very best thing for washing out coloured gold jewellery.

Messrs. B. H. Joseph & Co., of Frederick Street, Birmingham, have just introduced a novelty, the patent "glove button fastener," which can be had made up either in silver or gold. It is a useful and handy article, and we think likely to meet with a ready sale.

A large new clock has just been erected at Chesham Bois Church, Buckinghamshire, by John Smith & Sons, Midland Steam Clock Works, Derby. It is fitted with all the most recent improvements brought out by this firm, and is guaranteed not to vary more than fifteen seconds a month. The same firm are making large clocks with chiming machinery for Beaconsfield Church in the same county.

We understand that Messrs. R. & S. Garrard & Co., of Haymarket, have had the honour of submitting to the Prince of Wales the Queen's Vase and the Ascot Cup.

Among the exhibitors at the Inventions Exhibition as given in our last issue, Messrs. Stauffer, Son & Co. are included in the list. We are requested to state that this is incorrect, they not having any exhibit.

We have received from John C. Montgomerie, proprietor of the "Water of Ayr Stone and Hone Works," Stair, Ayrshire, several specimens of his celebrated Stone, which we have tested with satisfactory results. We learn that the proprietor has registered the names of his various qualities of hone stone as a protection against spurious imitations in the market. Further particulars can be obtained at the above address or from our advertising pages.

Mr. P. Howard, the writer of "Out and About," in this Journal, would be happy to supply special and original correspondence to other papers, &c., on moderate terms. We have pleasure in commending him to our friends as an able writer, and any letters sent to this office for him will be immediately handed over.

Foreign and Colonial Items.

By A. Fischer.

In Geneva the Association of Manufacturers and Dealers in Gold and Silver Ware has opened a library, containing a selection of the most important works for their branches, and a rich collection of designs and photographs, representing Jewellery articles of every country, from India to Spain and England. It includes also, besides some periodicals, a complete collection of the different Duty rates, kept up to date; the laws regarding the industry of precious metals in the different countries, and a manuscript repertoire of the firms with business relations in all parts of the world.

The *Journal Suisse d'Horlogerie* compares, in the following table, the prescription for the chronometer trials at Geneva, Kew, and Yale:—

Category.	Geneva. A	Geneva. B	Geneva. C	Kew. A	Kew. B	Kew. C	Yale. A	Yale. B	Yale. C
Ordinary Certificates.									
	s.	s.	s.	s.	s.	s.	s.	s.	s.
m.	1·5	1·5	1·5	2·0	2.0	2·0	2·0	2.0	2·0
d.	5·0	9·0	9·0	5·0 and 10·0	10·0	10·0	5·0 and 10·0	10·0	10·0
c pr. 1° C.	0·5	0·5	(0·5)	0·60	0·60	—	0.54	0·54	—
c pr. 1° F.	0·28	0·28	—	0.33	0·33	—	0·30	0·30	—
Very Satisfactory Certificates.									
	s.	s,	s,	s.	s.	s.	s.	s.	s.
m.	0·75	0·75	0·75	0·75	0·75	0·75	0·75	0·75	0·75
d.	2·50	4·00	4·00	2·50 and 5·00	5·00	5·00	2·50 and 5·00	5.00	5·00
c pr. 1° C.	0·20	0·25	(0·25)	0·27	0·36	—	0.27	0·36	—
c pr. 1° F.	0·11	0·14	(0·14)	0·15	0·20	—	0.15	0.20	—

In Chaux de Fonds, the last meeting of the public Course on Horology has just been held. It seems to have been a great success. All the pupils attended the lessons given very regularly, and in a vote of thanks to the director, Mr. M. Berner, they expressed the wish that in the Course given next winter, he might follow the same practical method of instruction, and initiate them and others again with that scientific and theoretical knowledge so much needed by the workmen, who are unable to attend the horological schools, and are obliged thus to discover for themselves, after a long time of work and trials, what science in many cases could have taught them at once.

From a letter signed by the Secretary of the society formed in Brooklyn for the protection of the respective interests of the workmen of the different branches of watch-case manufacture, and addressed to the President of the Society of Engravers in Geneva, we learn that the watch-case manufacturers of that city have lowered the salaries from 25 to 30 per cent., and that in many cases the few hands that are working can do so only at the rate of about three days a week. The engravers employed by a very large firm have been on strike since January last, as they found themselves unable to live on the wages offered. But, notwithstanding these difficulties, new workmen arrive there nearly every week, and thus aggravate matters still more. The association appeals to the solidity of all, and invites them not to accept the prices refused by the strikers, as by so doing, they would cease to command the sympathy which is extended to all the workmen employed in the watch-case manufacture of the United States.

The following table gives the value of the importations and exportations of Switzerland during January last:—

	Importation.		Exportation.	
	number.	declared value in frs.	number.	value in frs.
Watches in gold cases...	2,163	182,662	16,597	1,052,274
„ silver „ ..	2,371	62,902	92,970	1,741,433
„ nickel, &c. „	2,229	19,347	23,547	266,507
Watch movements finished but without cases..	482	4,185	3,856	29,675
Gold watch cases......	690	25,315	968	66,315
Silver „ „	4,880	47,855	23,434	250,209
Nickel, &c. „	3,474	3,971	2,960	10,362
	cwt.		cwt.	
Watch tools & materials	32	87,551	33	132,870
	number.		number.	
Superior clocks	526	7,150	1,392	10,098
Clock movements	3,956	10,222	5,530	50,346
Musical boxes, &c.......	57	5,414	4,002	103,111
	cwt.		cwt.	
Gold, silver, platine coined, unwrought....	20	1,033,887	134	2,786,929
Gold and silver ware, fine and imitation jewellery	14	212,534	8	226,535

The exportation from Switzerland during the first three months of this year, amounts to 16,698,374 francs, and is as follows:—

	For Watches in Cases in Gold.	Silver.	Other Metals.
Germany	1,859,325 fr.	1,974,438 fr.	126,177 fr.
Austria	910,586	913,597	44,520
France	424,316	669,322	274,899
Italy	369,682	542,229	38,889
Belgium	150,138	136,516	35,073
Holland	213,839	132,661	27,029
England	867,181	1,958,325	196,757
Russia..	326,171	328,363	33,062
Sweden	20,630	70,042	4,340
Denmark	15,440	34,445	5,061
Portugal	23,442	41,961	1,540
Spain	106,218	170,157	50,974
United States ..	111,998	107,523	157,671
Other Countries..	169,337	368,670	103,889
	5,568,303	7,448,249	1,099,881

For superior clocks	8,086 francs
Musical boxes, &c.	453,397 „
Watch movements	541,919 „
Watch tools and materials..	510,070 „
Watch cases in gold	231,323 „
„ „ „ silver	770,084 „
„ „ „ nickel, &c...	67,062 „

The Reichstag in Germany decided that instead of taxing the watches as before by weight, they should in future by taxed per piece, and fixes for gold watches 3s., and for others from 1s. 6d. to 6d. a piece, as uniform duty rate.

The well-informed *Moniteur D. L. B.* gives the following list of the principal wholesale houses in the watch, jewellery, silver ware and artistic bronze, &c., trade in San Francisco:—Nordman Bros., S. B. Dinkelspiel & Co., Nast & Greenzweig, Shelps & Miller, Levison Bros., M. Wunsch & Co., P.B. Simons & Co., Geo. C. Shreve & Co., U. R. Vanderslice, Randolph & Co., L. Braverman & Co., A. Herschman, A. Andreus, John Lévy & Co. It also states that very artistic articles are not much asked for just now, but that ordinary jewellery articles always find the readiest sale.

In Austria-Hungary the importation during January, 1885, was as follows:—3,039 gold and gilt watches; 14,374 silver watches; 4 gold and gilt watch cases; 586 silver and plated watch cases; 36 watch movements; 7,320 kilogrs wooden clocks; 2,739 kilogrs tools and materials. The exportation during the same period consisted of one gold and two silver watches; 470 kilogrs wooden clocks, and 2,403 kilogrs ordinary movements.

The following figures show the duty paid in Spain on watches and jewellery ware:—

Jewellery articles in gold, with precious stones or pearls, 2.50 fr. per hectogrs.; silver ware, 3.50 fr. per hectogrs.; gold, silver, and platine, 2.60 fr. per hectogrs.; gold watches, 7.50 fr. each; silver watches, 1.80 fr. each; ordinary clocks, with weights, alarm clocks, &c, 1.10 fr. each; superior finished wall or table clock movements, with or without cases, and chronometers, 4.70. francs. French manufacturers complain with good reason of this insufficient taxation, inasmuch as clocks with springs, of the value of about 25 to 30 francs pay just as much duty as chronometers of a value from 1,000 to 2,000 francs (4·70 francs); or gold watches of about 60 francs, the same as pocket chronometers of about 1,000 francs (7.50 francs), &c.

A better distinction of the different articles and the respective duty on them, will be found in the following list given by the General Consul of the French Colony of the Reunion (Africa), and which is observed for all articles of European origin.

Gold ware, silver, aluminium, platin, and other precious metals	the °/₀ Kg. nett frcs.	500·
Gold or silver plated articles and imitation jewellery	" " "	500·
Articles in other metals	" " "	100·
Watches with gold cases	the piece	4·50
" " silver "	" "	1·50
" " common metal cases	" "	1·
Movements without cases; gilt, nickled, or finished	" "	2·50
Other movements (including rough draughts) ..	" "	·20
Clocks for furniture, in wood	°/₀ Kg. nett	15·
" " " others	" "	25·
" " buildings	" "	10·
Clock movement	" "	50·
Chimes of bells	" "	60·
Padometer and different counters	per piece	1·
Gold watch cases	" "	1·20
Silver or common metal watch cases	" "	·50
Unwrought furniture for watch tools and materials	per °/₀ Kg. nett	50·
Watch, lunette and optical glasses unfinished	" " "	15·
" " " cut and polished	" " "	149·
Musical boxes (same as clock movements) ..		

The French Consul in Vienna gives the following addresses of the principal firms in the watch and jewellery trade:—

WATCHMAKERS.

Messrs. Anton Schlesinger, Rothenthurmstrasse, 17; Karl Suchy Sohne, Rothenthurmstrasse, 6; Karl Hartel, Rothenthurmstrasse, 4; Michel Mayer, Rothenthurmstrasse, 9; Eg. Marenzeller, Rothenthurmstrasse, 21; Klumak Bros., Rothenthurmstrasse, 15; Karl Urban, Lobkowitz platz, 3.

JEWELLERS.

Messrs. Biedermann, Graben, 13; Hoffstätter, Kohlmarkt, 7; Bolzani et Füssl, vi, Luftbadgasse; Klinkosch, Kohlmarkt, 26; Köchert Henrich, Neuer Markt, 15; Markowitsch Sohn, vi, Sandwirthgasse, 8; Mayers, B. Sohne, Stockim Eisenplatz, 7; Rustzki Jaschke, Neuer Markt, 16.

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Patents.

The following List of Patents has been compiled especially for "The Watchmaker, Jeweller, and Silversmith," by Messrs. W. P. Thompson & Boult, Patent Agents, of 323, High Holborn, London, W.C., and 6, Lord Street, Liverpool.

3917. James Ebenezer Floyd, of 244, City Road, London, Middlesex, for "Improved device for indicating 24 hours upon the usual 12-hour dials." Dated 27th March, 1885.

3922. Gustave Tuck, a communication from Charles Wagenfohr, of New York, for "Improvements in the means and methods of producing bronzes." Dated 27th March, 1885.

3923. Henry Wiggin (M.P.) Henry Arthur Wiggin, Alfred Smeaton Johnstone, and Walter William Wiggin, of 7, Staple Inn, Middlesex, for "Improvements in the manufacture of nickel and cobalt." Dated 27th March, 1885.

3981. William Gillett, of 134, Southamptan Buildings, Chancery Lane, W.C., for "Automatic apparatus for winding church and turret clocks, carillons, or chiming machines and chronoscopes, applicable also to other like purposes." Dated 28th March, 1885.

4036. George Sherlock and Harry Oscar Christensen, of 129, High Street, West Cowes, Isle of Wight, for "A safety catch for the prevention of brooch pins becoming unfastened when in use." Dated 31st March, 1885.

4071. William Beer, of 34, Southampton Buildings, Chancery Lane, W.C. for "Improvements in dress fastenings, such as studs, solitaires, and other like articles." Dated 31st March, 1885.

4264. John Hazelhurst Hill, of 77, Colmore Row, Birmingham, for "An improved fastener, applicable to bracelets, buttons, bags, and such like articles." Dated 7th April, 1885.

4345. John Clayton Newburn, a communication from La Société H. et G. Rouze fils, France, for "Improvements in solitaires, studs, and other like articles." Dated 8th April, 1885.

4394. Robert Atherton, of 70, Chancery Lane, W.C., for "Improvements in the dials of clocks and watches." Dated 9th April, 1885.

4498. William Arthur Thoms, and Herbert Frederick Oddy, of South Square, Gray's Inn, W.C., for "An improvement in the coating of metals with an electro deposit of platinum." Dated 11th April, 1885.

4709. Isaac Greenbury, of 96, Buchanan Street, Glasgow, for "Improvements in brooches." Dated 16th April, 1885.

4898. William Phillips Thompson, a communication from William Frederick Ware, United States, for "Improvements in studs or fasteners." Dated 21st April, 1885.

5024. William Robert Lake, a communication from Ludwig Holuska, Austria, for "Improvements relating to watches or timekeepers for attachment to walking sticks or the like." Dated 23rd April, 1885.

5034. Archibald Nisbett, of 24, Royal Crescent, Glasgow, for "Improved dial plates for clocks, watches, and other timepieces." Dated 23rd April, 1885.

5047. Lorentz Albert Groth, a communication from Heinrich Gaeusslen and Gotthilf Gaeusslen, Germany, for "Actuating mechanism for jewellery or ornaments." Dated 23rd April, 1885.

5221. Godfrey Hirst, of 1, Cleveland Villas, Whitby, Yorkshire, for "A new or improved serviette or napkin ring." Dated 27th April, 1885.

5239. Martin van Buren Ethridge, of 323, High Holborn, London, W.C., for "An improvement in timepieces." (Complete specification.) Dated 28th April, 1885.

5285. Carl Freidrich Herold, Arcade Chambers, Corporation Street, Birmingham, for "An improved fastener for bracelets, scarf slides, necklets, and similar articles." Dated 29th April, 1885.

5292. William Henry Hemming and George Henry Hazelwood, of 66, Spencer Street, Birmingham, for "An improved swivel for watch guards, alberts, and other chains." Dated 29th April, 1885.

5301. Rowland Bateman, of 77, Colmore Row, Birmingham, for "Improvements in solitaires." Dated 29th April 1885.

5243. Mrs. Victor Jaeggi, of 323, High Holborn, W.C., for "Improvements in the striking work of clocks." (Complete Specification.) Dated 30th April, 1885.

5349. David Armytage Davis, of 53, Chancery Lane, London, for "Improvements in the manufacture of tanks and cells for electrical and other purposes." Dated 30th April, 1885.

5380. Samuel Pearce, of 77, Colmore Row, Birmingham, for "Improvements in brooches and other articles of jewellery." Dated 1st May, 1885.

5438. Louis Van Bemmel, of 28, Southampton Buildings, Chancery Lane, W.C., for "An improvement in watches and clocks and other mechanism driven by coiled springs." Dated 2nd May 1885.

5485. Edmund Morewood, Llanelly, Carmarthenshire, for "Improvements in coating plates or pieces of iron, steel, or other metal with tin, terne, zinc, or other metals." Dated 4th May, 1885.

5501. John McFarland Crawford, of 1, Rue Lafitte, Paris, France, for "Improvements in illuminated clocks." (Complete Specification.) Dated 5th May, 1885.

5507. Aaron Smith Cartwright, of 3, Ford Street, Hockley, Birmingham, Warwickshire, for "An improved watch protector." Dated 5th May, 1885.

5592. David Armytage Davis, of 53, Chancery Lane, W.C., for "Improvements in the manufacture of tanks and cells for electrical and other purposes." Dated 6th May, 1885.

5621. George Anscombe, of 4, Cherry Street, Birmingham, for "Improvements in fastenings for bracelets, scarf rings, and other milar articles." Dated 7th May, 1885.

5642. Lorentz Albert Groth, a communication from Carl Gustaf Dahlerns, France, for "An improved method of extracting copper, nickel, cobalt, silver or gold from their ores." Dated 7th May, 1885.

5671. William Henry Gauntlett, of Middlesboro'-on-Tees, Yorkshire, for "Improvements in metallic thermometers with dials." Dated 8th May, 1885.

5678. Reginald Eaton Ellis, of 47, Lincoln's Inn Fields, London, W.C., for "An improved watch or clock glass." Dated 8th May, 1885.

5693. Alexander Browne, a communication from the Society Industriel of Montier Prandval, Switzerland, for "Improvements in the construction of keyless watches." Dated 8th May, 1885.

5716. Rowland Bateman, of 77, Colmore Row, Birmingham, for "Improvements in the fastenings of brooches, applicable also to other purposes." Dated 9th May, 1885.

5717. Morgan Roberts, 8, Quality Court, London, for "Improvements in the combination of a fork and spoon." Dated 9th May, 1885.

6146. Herbert John Haddan, a communication from Richard Bürk, Germany, for "Workmen's controlling apparatus or time-keeper." Dated 19th May, 1885.

6202. William Ernest Patterson and George Slater, of 7, Staple Inn, Middlesex, for "Improvements in solitaires or fastenings for cuffs, collars, and other articles of dress." Dated 20th May, 1885.

6222. Cornelius Edway Kelway, 17 and 18, Southampton Buildings, Middlesex. for "An improvement in timekeepers to adapt them for the purposes of range firing." Dated 21st May, 1885.

6231. Ignaz Hermann, of 23, The Parade, Lordship Lane, Dulwich, Surrey, for "A watch with compartments for simplicity and uniformity of construction and durability for wear." Dated 21st May, 1885.

6239. Lucy Brown, of Frelawney Road, Falmouth, for "Improvements in teapots." Dated 21st May, 1885.

6363. Amedée Combault, 226, Regent Street, Middlesex, for "Improvements in fastenings of jewellery, personal ornaments and buttons, applicable also to cocks or taps." Dated 23rd May, 1885.

Dissolutions of Partnership.

BELL BROS., Doncaster, Watchmakers and Jewellers. April 24, as regards Henry Bell. Debts by John and Edwin Bell, who continue under the same firm.

FRANKS & BALL, 4, Highbury Terrace, Hill Street, Coventry, Dealers in Black Diamonds. April 27. Debts by Thomas Ball, at 35, Smithford Street, Coventry.

GARNIER, E., & CO., 41, Beak Street, Golden Square, London, Manufacturing Jewellers. April 1. Debts by Edmé Garnier.

HAIDER, MAX, & CO., 98, Hatton Garden, London, Jewellers and Diamond Merchants. May 12, as regards Sigmund Tuteur. Max George Charles Haider continues.

KEAT & CO., 214, Goswell Road, London, wholesale jewellers. April 10, as regards Henry Edward Keat. Debts by George William Braddock, who continues under same firm.

LARRETT, EDWARD & CO., 23, Addle Street (late 7, Falcon Avenue), London, Importers of and Dealers in Jewellery and Fancy Goods. April 21. Debts by Edward James Larrett, who will continue in partnership with George Henry Brook, at 14, Holborn Viaduct, London, under the same firm.

OAKLEY & CO., Longton, Jet, &c., Manufacturers. March 24, as regards Peter Cope. Jacob Oakley continues on his own account.

PAILLARD, VAUCHER & CO., 62, Holborn Viaduct, London, Watch, Clock, and Musical-Box Manufacturers. July 1, 1884, as regards William Russell and John Kellie, Debts by Arthur Paillard, Alfred Holgate Russell, and Arthur Wellesley Russell, who continue.

Bankruptcy Proceedings, &c.

BEST, GEORGE CHRISTOPHER HENRY (trading as George Best), 7, Queen Street, 16, St. Mary's Street, and 24, Royal Arcade, all in Cardiff, Watchmaker and Jeweller. Examination at the Cardiff Court, on June 11, at Two.

BRETTELL, WALTER, 83, High Street, Hartlepool, and 54, Lynn Street, West Hartlepool, Jeweller. Examination at the Sunderland Court, on May 14.

COLE, WILLIAM HOOPER, 27, Sidmouth Street, Devizes, Jeweller, Watch and Clock Maker. April 29. Examination at the Bath Court' on May 14, at Half-past Eleven.

FLOWER, ROBERT, Sherborne, Watchmaker. May 22. Examination at the Yeovil Court, on June 11.

O'CONNOR, THOMAS, 7, Granville Terrace, and High Street, Stone, Watchmaker and Jeweller. May 18. Examination at the Shire Hall, Stafford, on June 3, at Twelve.

PROUT, JOSEPH FERRIS, 3, Bank Street, Newton Abbot, Watch Maker. May 13. Examination at the Exeter Court, on June 11, at 11.

SMITH, WILLIAM, Old Wheel Inn, Leicester Row, Coventry, Watch Finisher. May 23. Examination at the Coventry Court, on June 15.

SATTELE, ALOIS, 308, High Street, Lincoln, Watchmaker, Jeweller, and and Silversmith. May 7. Examination at the Lincoln Court, on May 30, at 2.30.

TRATTLES, MATTHEW, Whitby, Jet Ornament Manufacturer, &c. May 5. Examination at the Stockton-on-Tees and Middlesbrough Courts, on May 15.

WHITE, WILLIAM (trading as White, Sons, & Co.), 169, Upperthorpe, and Burgess Street, Sheffield (late trading with John Sutherland Henderson as White, Henderson, & Co.), Silver Plate Manufacturer. May 5. Examination at the Sheffield Court, on May 28, at 11.30.

Bills of Sale.

(ENGLAND AND WALES.)

BRETON, ROBERT CAMILLE, Lynmouth Villa, 145, Graham, Jeweller. April 27. £30. Given to Henry Jacobs.

CRAMPTON, JOHN, Hillside, Coolhurst Road, Crouch End, Diamond Broker. May 18. (Wife's settlement). Given to Helen Crampton.

COOKE, GEORGE COLLETON, Northcote, Cumner Road, Sutton, Optician. May 15. £110. Given to George Brinsley.

DUPIUS, ALFRED, 31, Tavistock Place, Tavistock Square, Jeweller. May 8. £90. Given to Gilbert Caught.

DEANE, WILLIAM HENRY, 43, Preston Street, Brighton, Jeweller and Silversmith April 28. ((Indemnity). Given to Lewis Lyon.

ERT, ABRAHAM ELEAZER (trading as Adolph Ert), 24, Mount Street, New Road, Whitechapel, Diamond Splitter. May 15. £45. Given to the Consolidated Credit Corporation.

HEWITT, L. H., 12, Tooke Street (late 37, Mulberry Street, Liverpool, Watchcase-Spring Maker. April 28. £30. Given to John H. Richardson.

JACOBS, MOSES, 48, Nicholas Street, St. Peter's Road, Mile End, Watchmakers' Dealer. May 11. £42. Given to the Alliance Co.

LAMB, FREDERICK, AND ANOTHER, 17, Albert Road, Morice Town, Devonport, Watchmaker, &c. May 11. £34, &c. Given to Richard Kelley.

WILLIAMS, ADRIAN MALLETT, 42, Queen's Road, Dalston, and City, Watchmaker, May 2. £30. Given to the Consolidated Credit Corporation.

ZOLKI, ABRAHAM, 4, Clinton Place, Broomhall, Sheffield, Jeweller. May 6. £225 10s. (Absolute sale to wife), Given to Eliza Zolki.

Bills of Sale Re-registered.

(ENGLAND AND WALES.)

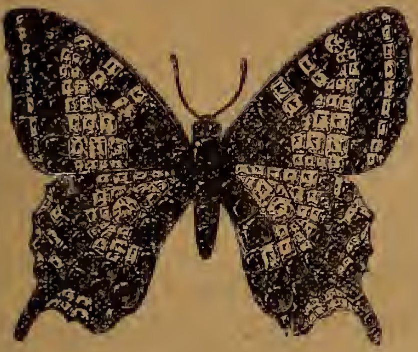
JOHNSTON, WLLIAM (formerly of 1, Park Terrace, Gateshead, and 41, Mosley Street, and now of 6, Mosley Street, Newcastle-on-Tyne), Jeweller and Silversmith, to Lewis Lundi. B.S. filed April 27, 1880, for £500, and other money; re-reg. April 21.

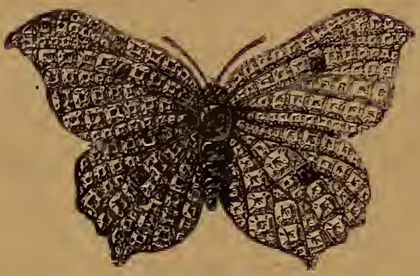
MILES, JAMES, 95, Regent Street, Leamington, Watchmoker, &c., to Frederick J. Braham (since transferred to Martha Miles). B.S. filed May 12, 1280, for £185; re-reg. April 22.

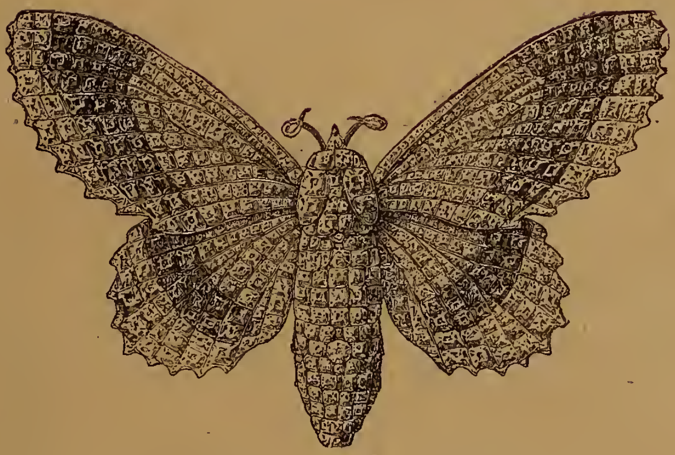
SOLOMON, JOSEPH, King Street, Hanley (formerly 59, Harley Street, Hanley), Jeweller, &c., to William Ambrose. B.S. filed April 30, 1880, for £40; re-reg. April 25.

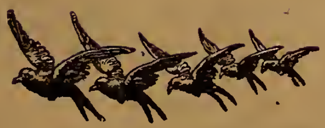
STARKEY, ALFRED, 56, Guildford Street, Russell Square, London, Jeweller, &c., to Alexander McGlashan. B.S. filed April 19, 1880 for £267, &c.; re-reg, May 11, by order on terms.

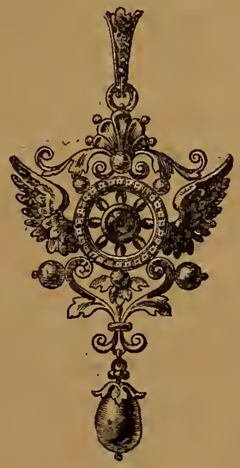
DESIGNS FOR MODERN JEWELLERY.

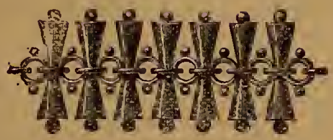












NEWSOME & CO.,

Wholesale Watch Manufacturers,

14 & 15, BUTTS, COVENTRY.

SILVER ENGLISH LEVER WATCHES

OF EVERY DESCRIPTION; ALSO

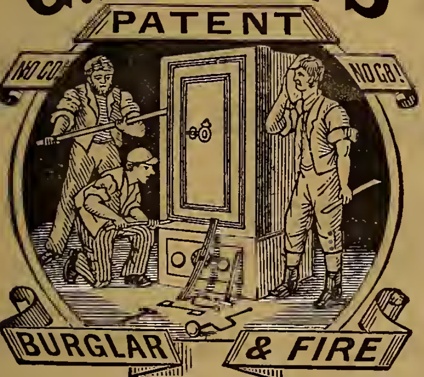
Gold Lever Watches, Three-quarter and Full Plate;

Three-quarter Plate Keyless Centre Seconds Stop Watches in Gold and Silver.

FOR HOME AND EXPORT. SPECIAL QUOTATIONS FOR SHIPPERS.

Important to Diamond Merchants, Smelters, Jewellers, &c.

G. PRICE'S



RESISTING SAFES

Maker to H.M. Board of Works.
The Admiralty, Bank of England,
&c., &c.

GEORGE PRICE'S

Improved Patent Hold-fast

Is in advance of anything yet introduced where absolute security is required.

GEORGE PRICE'S

New Patent Padlocks

For Jewellers' and Warehouse doors, cannot be taken away, and are most secure.

GEORGE PRICE'S

Patent Latches and all kinds of Locks,

GUNPOWDER PROOF AND UNPICKABLE

GEORGE PRICE,

34, QUEEN VICTORIA STREET, E.C.,
AND CLEVELAND SAFE AND LOCK WORKS, WOLVERHAMPTON

NOTICES.

J. C. BECHTLER, WATCHMAKER, begs to inform the Trade that he has started business on his own account under the name and style of J. C. BECHTLER and Co., Watchmakers, Jewellers, and Opticians, Allahabad, India.

TO WATCHMAKERS AND JEWELLERS.—To dispose of a Watchmaker's and Jeweller's business, doing good business; best situation on the road and 2 minutes' walk from new DOCKS OF MANCHESTER SHIP CANAL; reasons for leaving must go abroad.—Apply to J. S tadle195, Regent-road, Salford.

WATCHMAKERS, JEWELLERS, AND OTHER TRADES. Splendid opening, fine premises, situate in main road, in centre of a very good and rapidly growing district, well worth inspection.—Apply, Mr. Nichols, New Shops, Brockley Road, 3 minutes from Station, L. B. & S. C., or L. C. D.

WANTED, a small portable Transit Instrument, with Eyepiece in the Trunnion.—Apply to I. Richardson, South Ashfield, Newcastle-on-Tyne.

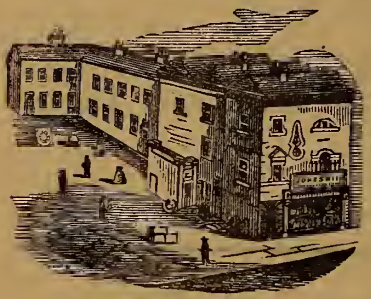
A WATCHMAKER'S ASSISTANT. German. 25 years of age. Self-dependent Workman. Wants a situation in England. Please address H. G. Themer, 29, Wenzelgasse, Bonn a Rhine, Germany.

CANTOR LECTURES ON WATCHMAKING, by EDWARD RIGG, M.A., delivered before the Society of Arts, in February, 1881, will be sent post free to any address in the United Kingdom for 1s. 1d. in stamps.

WANTED, by a Respectable Young Man, a Situation in a Jewellers' Shop, can repair any kind of Watches, Clocks, and ordinary Jewellery jobbing, also understands Stock and Counter Trade. —Apply to F. Knight, 14, Church Road, Hammersmith, London.

WATCHMAKERS AND JEWELLERS.—Required a re-engagement as Manager or Salesman. London experience. Thorough practical knowledge of all branches in the Watch Trade. Unimpeachable reference for 18 years' service.—Address, "Eltan," Office of this Journal.

WANTED.—Considerable quantities of *Watch Springs*, 12 meter length, 7 millimeter broad, 1 millimeter thick. Offers of first-rate makers to H.C.O., 2852, care of Messrs. Hausenstein & Vogler, Advertising Agents, Hamburg.



JOHN SMITH & SONS,

MIDLAND STEAM CLOCK WORKS, DERBY.

Manufacturer of all kinds of Church, Stable, and House Clocks, Chiming Clocks, Clocks for Watchmakers' Fronts, Regulators, Watchman's Tell-tale Clocks, &c.

WHEELS AND OTHER REQUISITES SUPPLIED TO THE TRADE.

CROCIDOLITE

This Stone possesses a lustre and radiance superior to anything of its kind yet discovered, emitting rays of most beautiful and variegated colours, equal if not surpassing the Oriental Catseye.

THE STONE IS EMINENTLY SUITABLE FOR EVERY BRANCH OF TRADE, ESPECIALLY JEWELLERS, SILVERSMITHS, ELECTRO-PLATERS, CLOCK MANUFACTURERS, &c.

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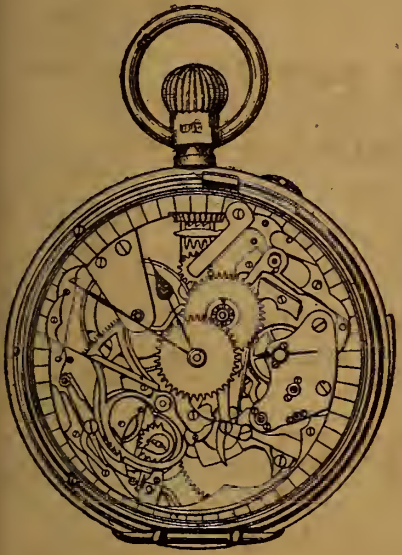

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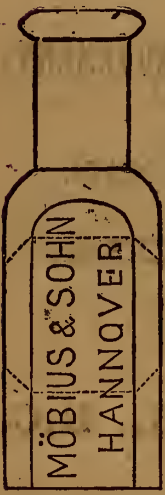

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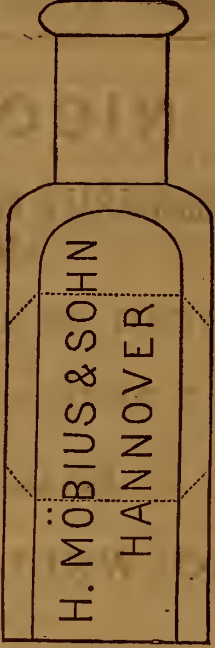

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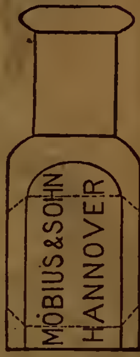

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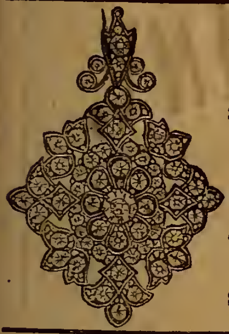

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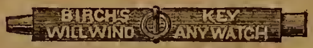

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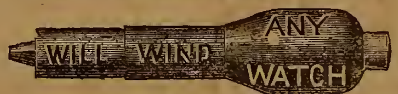

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